UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/786,507	05/01/2001	Arzhang Ardavan	117-342	8750

23117 7590 12/27/2005

NIXON & VANDERHYE, PC
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203

EXAMINER	
SOUW, BERNARD E	
ART UNIT	PAPER NUMBER
2881	

DATE MAILED: 12/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/786,507	ARDAVAN ET AL.
	Examiner	Art Unit
	Bernard E. Souw	2881

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *21-28,30-32,36-44 and 50-80* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *21-28,30-32,36-44 and 50-80* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 May 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/18/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Amendment

1. The Amendment filed 05/18/2005 in response to the Office Action mailed 11/30/2004 has been entered. The present Office Action is made with all the amendments being fully considered.

Claims 1-20, 29, 33-35 and 45-49 have been previously cancelled.

Claims 21-28, 30-32, 36-44 and 50-80 are pending in this Office Action.

Information Disclosure Statement

2. Receipt is acknowledged of information disclosure statement (IDS) submitted on 05/18/2005. The submission is in compliance with the provisions of 37 CFR 1.97.

A signed copy of the information disclosure statement is here enclosed.

Supplemental Figures

3. Three new figures, Fig.I, Fig.II and Fig.III are filed with the 05/18/2005 as support to Applicant's experimental data (Exhibits A-D). Applicant's 07/01/2005 response to the Notice of Non-Compliant Amendment (37 CFR 1.121) issued on 06/03/2005 by the Office, clearly declares that the new submitted figures Fig. I, Fig. II and Fig. III are not parts of the application, and hence, not parts of Applicant's claimed invention. Hereinafter, new Figs. I, II and II are to be addressed as supplemental figures.

However, Fig.II shows a "*non-spherically decaying*" cusp in the (θ,φ) directions), with its locus lying on the same azimuthal ($\theta=90^0$) plane as the circular source, which

directly contradicts the invention as claimed, as represented by Fig.4 of the original application (which shows a "*non-spherically decaying*" cusp in the (z,φ) direction). Obviously, Applicant's experimental data (Exhibits A-D) does not support Applicant's invention. In order to be considered as a support an experimental measurement should have been made in the z-direction, or (z,φ) directions, as claimed in the original disclosure according to Fig.4.

As a courtesy, the Examiner is willing to prosecute this application by taking the experimental data (Exhibits A-D) including its supposed support, i.e., Figs. I, II and III, into consideration. However, even if the experimental data is here considered, Fig.II still *contains the same error as Fig.4* of the disclosure, i.e., that the (direction of the emitted) radiation can neither be represented by the supplemental Fig.II nor the original Fig.4 of the disclosure, since in both cases the array or the source is *rotation-symmetric* traveling wave. As known in the art, a rotation-symmetric source (without any distinguished φ coordinate) can ***not*** possibly emit radiation in a distinguished φ direction, but instead, must emit in a totally smeared φ direction ($0 \leq \varphi \leq 2\pi$). This is NOT a NEW GROUND of rejection, since it has been previously raised with regard to Fig.4 in the 11/30/2004 Office Action, pg.96, which is here reproduced(highlights and underlines added):

> ***In case the cusp locus is not smeared out, it would be necessary to explain, why it is not smeared out*** *despite the rotation-symmetric traveling wave used in the experiment and specify the* ***unique value of φ^*** *in the experiment, complete with a persuasive reasoning.*

and once again in section 43.e.2 on pg.68 (highlights and underlines added):

> *"Otherwise, applicant has no choice except to agree with the examiner that in reality the locus of C is not a line along the z axis as illustrated in applicant's Fig.4, but* ***smeared out 2nπ-fold around the z axis****, leaving it --at most-- defined by the coordinates (θ,z) alone. This will destroy any significance of interpreting the cusp as a diffraction 'spot' ".*

In the above quotation, the wording "*the coordinates (θ,z)*" is no other than the azimuthal ($\theta=90^0$) plane already recited previously. (See also section 43, Examiner's Response to Applicant's Arguments).

Even if supported by supplemental Fig.II, Applicant's experimental data does not distinguish from the Examiner's calculations based on conventional phased array, as already demonstrated in previous Office Action, prior to Applicant's submission of Fig.II. As a matter of fact, every aspect of Applicant's experimental data claimed as being a unique result of Applicant's invention falls within quantitative estimates previously made by the Examiner, which is incorporated herein by this reference. Therefore, Applicant's supplemental figures I, II and III, does not alter any conclusion already made in the previous Office Action. To Applicant's disadvantage, it is now discovered that the supplemental Fig.II contains a theoretical error exactly of the same nature as previous Fig.4, which has been already raised by the Examiner in the previous (11/30/2004) Office Action, section 43.e.2, as recited above.

Remarks and Arguments

4. Applicant's Remarks and Arguments filed 05/18/2005 has been fully considered. However, they have failed to remove any of the previous rejections and objections. A

detailed analysis of this failure is presented at the end of this Office Action (see Examiner's Response to Applicant's Arguments). In consequence of Applicant's failure, a full section of previous Office Action recited on pgs. 50-115, i.e., "*Detailed Evaluation of Applicant's Experimental Data*", remains in force, and is incorporated herein by this reference.

Personal Interview Summary Corrected

5. The Personal Interview Summary mailed on 11/30/2004 with the previous Office Action has been corrected per Supplemental Office Action dated 12/20/2004.

EVALUATION OF NEW (05/18/2005) IDS

6. Applicant's new IDS references turned out to be in support of the Examiner's position and in disfavor of Applicant's invention. Therefore, an evaluation is given below, prior to statements of legal actions:

(1) Resami et al. (2000)

(a) Resami's contains subject matters mostly unrelated to Applicant's invention;

(b) Resami's justifies the Examiner's opinion that the superluminality observed in experiments is of *imaginative* nature, hence expressed by very specific terms, such as, e.g., "*seem*", "*apparent*", "*seem to appear*", etc.:

(b.1) Abstract, line 1-2: " ... *in which superluminal motions seems to appear* ...",

(b.2) Paragraph II, pg.60, Section B, Galactic Microquasars, lines1-2: ".... *as to the apparent superluminal expansions observed* .....",

(b.3) Paragraph VII, pg.69, Conclusion, lines 2-3: "... *experimental sectors of physics in which superluminal motions seem to appear*";

(c) Resami et al. arrives at the same result as beam forming/steering effect in phased arrays, i.e., on pg.60, Paragraph II, pg.60, Section B, Galactic Microquasars, lines 11-14: "*... in the 'optical boom' phase analogous to the acoustic 'boom' produced by a plane traveling with constant supersonic speed*" is the same as Fig.1B in the Appendix of Examiner's 11/30/2004 Office Action, also recited in section 22 on pg.23, lines 8-13, and section 43(d) on pg.63, lines 10-15, reciting the relation between single-envelope Cerenkov-cone, single pulse shock wave, supersonic boom, and broadband spectrum of the signal according to the Fourier transform:

(c.1) Resami's continuous distribution of frequency spectrum is a natural result and/or consequence of Fourier transform of a pulsed waveform or a single step of phase disturbance, and

(c.2) Resami's single pulse phase wave front is nothing else than the wavefront of a radiated beam resulting from phased array beam forming/steering. The various definition and/or terminologies are different ways of interpreting (i.e., imagining) the phase characteristics of the array in a beam forming/steering effect, showing that the *superluminal motion is of imaginative nature*;

(d) Resami's does not claim any "*non-spherically decaying radiation*" as Applicant does, clearly because the authors are fully aware of the *imaginative nature* of the *apparent motion*, whether superluminal nor subluminal (see (1)b.1,2,3 above);

(e) Resami's does not discuss any "*Doppler effect*", neither ordinary nor anomalous, since Doppler effect can only be a result of a *real*, i.e., *physical*, but not caused by an *imaginative motion* of the source (see section 11(e) of this Office Action), and further, for the same reason as in 6.1(d) above.

(2) Bessarab et al. (2004)

(a) Bessarab's is totally unrelated to Applicant's invention;

(b) *Imaginative* interpretation of phased array beam forming/steering effect:

(b.1) Bessarab's Vavilov-Cerenkov effect recited in col.1, 3rd full paragraph, refers to real, physical, material particles;

(b.2) Bessarab's "faster-than-light source" refers to the phase wavefront of a single pulse of X-ray excitations on a metallic surface, which, in turn emits a directed beam of electromagnetic pulse (EMP), *exactly in the same manner* as a phased array in a single pulse beam forming/steering excitation mode emits a directed pulse of electromagnetic waves (i.e., similar to Fig.1B of the Appendix of the Examiner's 11/30/2004 Office Action, also described in sect.22 on pg.23, lines 8-13, and sect.43(d) on pg.63, lines 10-15, reciting the relations between single-envelope Cerenkov-cone, single pulse shockwave, supersonic boom, and broadband spectrum of the signal according to the Fourier transform);

(c) Bessarab's does not discuss any "*non-spherically decaying radiation*";

(d) Bessarab's does not discuss any "*Doppler effect*", neither ordinary nor anomalous.

(3) Ginzburg (1972)

(a) Ginzburg's is restricted to theoretical work only (same as Bolotovskii's, which has been already discussed in the previous Office Action);

(b) Imaginative interpretation of phased array beam forming/steering effect:

(b.1) Ginzburg's Eq.1 on pg.92 is *exactly the same* as Examiner's Eq.1c on pg.72, section 43f, of previous Office Action, so is also its physical interpretation;

(b.2) Wavefront k in Ginzburg's figure on pg.92 and Ginzburg's "*superluminal motion*" is the same as phase wavefront (single pulse) of formed/steered beam and the phase velocity (periodic wave) in beam forming/steering phased array (see 2(b.2) and 3(b.1) above);

(c) Ginzburg's does not discuss any "*non-spherically decaying radiation*";

(d) Pg.92, col.1, lines 4-12 and pg.93, last paragraph:

(d.1) Ginzburg's "*anomalous Doppler effect*" is an effect of negative refraction index in a plasma that is totally unrelated to, and has nothing to do with, Applicant's invention (see Weiss <http://www.phschool.com/science/science_news/articles/doppler_toppler.html>);

(d.2) No evidence of Doppler effect due to the *imaginative* superluminal motion.

(4) (Chapter VIII) On Superluminal Radiation Sources

(a) Theoretical work only (same as Bolotovskii's, which has been already discussed in the previous Office Action);

(b) Contains subject matters mostly unrelated to Applicant's invention;

(c) Imaginative interpretation of phased array beam forming/steering effect:

"*superluminal motion*" is the same as phase velocity (for periodic wave) or phase wavefront (for single pulse) of a formed/steered beam in beam forming/steering phased array (same as (2b) and (3b) above);

(c) Does not claim any "*non-spherically decaying radiation*", as Applicant does;

(d) No evidence of Doppler effect due to the *imaginative* superluminal motion.

(5,6,7) Ardavan et al.

(a) All three references are publication articles with substantially the same contents as Exhibits B,C,D already addressed in the previous Office Action. These formal publications in professional journals do not bring any new aspects. All the Examiner's previous objections and rejections stand to be applicable to Applicant's invention, and further supported even by Applicant's new IDS, as recited above;

(b) Continuous distribution of frequency spectrum is a natural consequence of Fourier transform of a pulsed waveform or a single step of phase disturbance (shock wave), and the single pulse phase wave front is the wavefront of the radiated beam resulting from a beam forming/steering effect;

(c) Both "*superluminal motion*" and "*acceleration*" are different ways of interpreting (i.e., imagining) the phase characteristics of an array in a beam forming/steering operation mode; in other words, the superluminal motion is of *imaginative* nature;

(d) No evidence for claims of "*non-spherically decaying radiation*". The authors derived such an imaginative effect merely from an *imaginative superluminal motion* of the phase characteristics in a phased array beam forming/steering;

(e) No evidence for any "*Doppler effect*", neither ordinary nor anomalous.

Conclusion:

Applicant's own references justify the Examiner's position. The Examiner's judgment regarding the incredibility of Applicant's invention is thus correct and the pertinent rejections are proper and appropriate.

Evaluation of Applicant's Supporting Data Remains In Force

7. The Examiner's Evaluation of Applicant's supporting data titled "*Evaluation of Applicant's Experimental Data*" as previously presented at the end of the 11/30/2004 Office Action, specifically on pages 50-115, remains in force, because none of Applicant's arguments is persuasive. Consequently, said evaluation document is incorporated herein by this reference.

Previous Objection Reiterated

8. Since in reality there is no "*superluminal velocity*" whatsoever, but only "*phase delay*", as generally known and used in the pertinent art, and furthermore, because the word "*superluminal velocity*" has been historically misinterpreted, misused and manipulated, it would certainly help this prosecution a lot if Applicant would eliminate every word "*superluminal*", including all related terms, from the entire disclosure in order to conform with the reality. Since the word "*superluminal velocity*", or "*superluminal motion*", or the like, is nothing else but another way of representing the phase velocity in

phased array beam forming/steering, there will be nothing lost in substituting the imaginative and deceptive term "*superluminal velocity*" with a phase velocity (see Eqs. 1.c-d referring to Fig.1B of previous Office Action), $V_d = d/\delta t = c/\sin\varphi = c/\cos\theta$, where d is the inter-element distance of the array, δt is the time delay between the excitation of two adjacent array elements, c is the phase velocity of electromagnetic waves in vacuum, and φ (or $\theta=90^0-\varphi$) is the resulting, or the desired, beam steering angle with respect to the normal (or the linear array). In the beam forming/steering mode this phase velocity V_d is always larger than c, since $\sin\theta$ is <1. Thus, eliminating the word "*superluminal*" will not change anything, but will certainly prevent misunderstanding of the terminology itself.

This objection of the word "superluminal" is a repeat of the prior Office action. Where appropriate, new facts and/or important arguments will be highlighted for Applicant's convenience.

Claim Objection Withdrawn

9. Claim 32 having been amended, its previous objection is now withdrawn.

It is to be noted, claims 31 and 32 become identical.

Duplicate Claims, Warning

10. Claims 31 and 32 are objected to because of the following informalities:

Claim 32 is identical to claim 31. Appropriate correction is required.

Applicant is advised that should claim 31 be found allowable, claim 32 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Objection to the Specification

11. The disclosure stands objected to because of the inconsistencies (a - f) below. These inconsistencies resulted in an *incredibility* of the invention, as already stated in all the previous office actions (dated 11/30/2004 and 12/15/2003), now reinforced by the analysis and new findings presented in this office action.

(a) On page 4, lines 4-5, the wording *"the superluminally rotating* **source** *from the standpoint of geometrical optics"* is in direct violation of known laws of nature, i.e., the Special Theory of Relativity, which prevents any *material object* --such as a "source"-- from moving with luminal (let alone superluminal) speed in vacuum, since its mass would then become infinite, and the causality principle violated, the latter even without regard of the mass, as generally understood in the art.

This objection remains essentially the same as previously applied, since applicant's new response & arguments dated 11/30/2004, supported by the new IDS submitted with the amendment, have failed to persuasively remove the prevailing objection. This conclusion is in full agreement with [PhysicsWeb'2004]) at

<http://physicsweb.org/article/news/8/7/161>, stating that the inventors "...*have got their physics wrong*". As such, it provides a basis for the §101 rejections made in this office action (MPEP §2107.01/II; see later).

Should Applicant have got their physics right, the experiment would show evidence of success (see the end of section 14 in this Office Action).

(b) On page 6, paragraph 1, lines 1-2, the wording "*so the speed of the source exceeds the wave speed*", the wave speed being tacitly understood as being the light speed in vacuum, c, is again in direct violation of known laws of nature, i.e., the Special Theory of Relativity and the principle of causality, as previously recited. This objection remains essentially the same as previously applied, since applicant's response & arguments, supported by the new IDS submitted with the amendment, have failed to persuasively remove the prevailing objection. This conclusion agrees and is supported by the general opinion from scientific community commenting on applicant's invention in [PhysicsWeb2004], as cited above. As such, it provides a basis for the §101 rejections made in this office action (MPEP §2107.01/II).

(c) On page 7, paragraph 3, line 1, the wording "*In the highly superluminal regime*" is again in direct violation of known laws of nature by the same token, as recited above, since the word "*regime*" is unambiguously representing a material object. This objection remains essentially the same as previously applied, since applicant's response & arguments dated 11/30/2004, supported by the new IDS submitted with the amendment, have failed to persuasively remove the prevailing objection. This

conclusion agrees and is supported by the general opinion from scientific community commenting on applicant's invention in [PhysicsWeb2004], as cited above. As such, it provides a basis for the §101 rejections made in this office action (MPEP §2107.01/II).

(d) On page 27, paragraph 3, lines 7-8, the wording "this polarized region can be set in accelerated motion with a superluminal velocity" is again in direct violation of known laws of nature by the same token as recited above, since the word "region" is unambiguously representing a material object. This objection remains essentially the same as previously applied, since applicant's response & arguments dated 11/30/2004, supported by the new IDS submitted with the amendment, have failed to persuasively remove the prevailing objection. This conclusion agrees and is supported by the general opinion from scientific community commenting on applicant's invention in [PhysicsWeb2004], as cited above. As such, it provides a basis for the §101 rejections made in this office action (MPEP §2107.01/II).

(e) Owing to the objections (a) to (d) above, and possibly still many others not yet discovered/identified by the Examiner, the credibility of the invention is very seriously put in question, for its obvious violation against known laws of nature, as previously recited. This objection remains essentially the same as previously applied, since applicant's response & arguments dated 11/30/2004, supported by the new IDS submitted with the amendment, have failed to persuasively remove the prevailing objection. In this regard, even the recitation of a "superluminal" source distribution must

be considered incredible, unless it is accompanied by a careful definition that such source does not represent material objects. This has been done in [Bolotovskii'1972], in which several pages long have been dedicated to prevent possible misunderstanding and misinterpretation. On the other hand, the present disclosure not only misuses the term "*superluminal*" many times, but also tries to stretch out Bolotovskii's teaching by subjecting it to "*acceleration through the speed of light in vacuo*" and "*centripetal acceleration*", these two new aspects being absent in the original Bolotovskii's teaching.

As already recited in the previous office action, the applicant seems to vaguely follow Bolotovskii's definition, e.g., on page 2, paragraph 2, line 1, by reciting the word "*pattern*", such as in *"The speed of the moving distribution pattern may be superluminal",* and again on page 3, paragraph 3, lines 4-5, in *"whose distribution patterns propagate with a phase speed exceeding the speed of light in vacuo".* However, applicant's persistence of using terminologies that have been already objected by the examiner leads to the conclusion that applicant's vague and ambiguous statements are *effectively overridden* by applicant's more frequent statements emphasized throughout the entire disclosure, claiming for "superluminal" velocities of *material objects,* e.g., on pg.4/line 8, reciting a *"superluminally rotating source".* If the ambiguous terminologies were not meant to represent physically moving material objects, there would be no hesitation or reluctant from Applicant to eliminate the word "superluminal" and the likes from the disclosure, as repeatedly requested by the Examiner, because actually nothing is thereby lost (see section 8 above). Applicant's

non-compliance only indicates that the ambiguous wordings are meant by Applicant to represent materially moving objects.

One of the most compelling evidences for applicant's confusion in interpreting his own non-material "distribution pattern" as being a material object is documented in applicant's own article in Exhibit D, reciting in Appendix C, pg.6675, Col.1/ll.11-12, a "*Doppler effect*", where there is in fact no radiating charge that actually moves. As known to one of ordinary skill in the art, a *Doppler effect* can only be caused by a materially moving source, but never by a relative phase of the oscillation of the distribution of the emitting particles, the latter being the case in applicant's invention.

It is to be emphasized, no imagination can ever produce real effects, such as the Doppler effect. A similar criticism has been also raised by A. Hewish in Phys. Rev. E 62 (2) 2000, pg. 3007, Col.2/11.8-12. In full agreement with Hewish's comments cited in "Revolutionary Device Polarizes Opinion", Physics World 2000 (applicant's IDS filed 5/17/2004), hereinafter [IDS/PhysicsWorld'2000], also in [PhysicsWeb'2004] and many other publications from the scientific community, the examiner disagrees with applicant's statement reciting a similarity between the pile-up of light wavefront with the Doppler effect: Applicant's spherical (3-dimensional) or circular (2-dimensional) wavefront essentially propagates with strictly luminal velocity c, as clearly shown in Fig.1B of the previous Office Action. The pile-up that produces wavefront envelopes, which eventually intersect to form a "cusp", is a mere result of a timely change of the relative phase of the distribution of *many stationary* light sources, and is essentially the same as the phase-shift in optical and/or ultrasonic beam forming/steering. This timely change of

relative phase distribution has been *misunderstood* by applicant as *a single* light source that "*moves*" with "*superluminal velocity*". In reality, both the single light source and its superluminal motion are *purely virtual imaginations*.

Another compelling evidence for similar misinterpretations by Applicant is the previously cited statement made in Exhibit D, Fig.1(e) on page 3, reciting that the array curvature "*introduces centripetal acceleration in the moving polarized region*". Again, the "*movement*" of the polarized region is here misconstrued by applicant as being physically real, so as to render it capable of causing something real, such as "centripetal acceleration" that would allegedly generate a unique type of radiation. Similar to the term "*moves*" with "*superluminal velocity*", applicant's "*centripetal acceleration*" is here also purely *virtual*. As generally known in the art, no *virtual* cause would ever be capable of producing something real.

(f) The examiner suggests to eliminate the wording *"superluminal"* and "*accelerated through the light velocity in vacuo*" entirely from the *disclosure.* As previously stated, the terminology "*superluminal"* is unreal, and hence, inappropriate, because in fact there is *no superluminal speed* at all. A similar term, "*accelerated through the light velocity in vacuo*", is applicant's attempt to stretch out Bolotovskii effect beyond physical reality, as recited previously.

In addition to the previous citations taken from Atwater's textbook "*Introduction to Microwave Theory*", which here remains 100% in force because applicant has failed to effectively responded with persuasive arguments, further examples from the non-mechanical beam-steering area in optical communications and medical ultrasonic

technology are presented in the previous Office Actions in support of the previously cited prior art references of Hopwood et al. (USPAT # 4,749,995) in Col.2/11.40-47 in reference to Fig.1, and O'Donnell et al. (USPAT 4,809,184) in Col.4/11.30-35 and Col.5/11.20-30 in reference to Fig.1 (from PTO-892 of previous Office Action).

The examiner's standpoint has been even supported and justified by the affidavit under 37 CFR 1.132 submitted on applicant's behalf. The affidavit's example of a pair of scissors "*whose tips are moving just below the speed of light* but the *intersection of the blades moves at a speed faster than the speed of light*" completely agrees with the examiner, that the material object itself (the scissors' tips or blades and the current or charge itself) does not move faster than light, whereas the "superluminally moving" intersection represents locally and materially different parts of the blade that are not interrelated to each other by any causality, thus not in violation of Einstein's causality based on space-like events. On the other hand, Applicant's superluminality represents a direct violation of this Einstein's causality. As a matter of fact, Applicant's affidavit even admits, *there is in fact no superluminal movement (of material object) at all*. Ordinary skill in the art of phased-array beam-steering considers the same fact as *phase delay* that *has nothing to do* with any motion at all, let alone a superluminal motion, as *suggested* by Applicant. This justifies the examiner's request to eliminate every recitation of the word "superluminal" from the disclosure.

Reiteration of Previous §101 and §112 Rejections

12. Since the supporting documents (Exhibits A-D) and the new IDS filed 05/18/2005 have failed to remove all the previous §101 and §112/¶.1 claim rejections, the rejections based on an incredibility of the invention and/or its inoperativeness, as well as similar §112/¶.1 rejections based on non-enablement, and the §112/¶.2 claim rejections based on indefiniteness, remain in force.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

13. Claims 21, 27, 61, 65, 74 and 78 are rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a specific asserted utility or a well established utility.

These rejections are not based on applicant's failure to specifically assert any utility, but because the specific utility asserted by applicant is deemed incredible in the light of knowledge in the art, or speculation at best (see later citation of MPEP §2107.01/II). MPEP § 2107.01/II further states

> *An invention that is "inoperative" (i.e., it does not operate to produce the results claimed by the patent applicant) is not a "useful" invention in the meaning of the patent law. See, e.g., Newman v. Quigg, 877 F 2d 1575, 1581, 11 USPQ2d 1340, 1345 (Fed. Cir. 1989); In re Harwood, 390 F.2d 985, 989, 156 USPQ 673, 676 (CCPA 1968) ("An inoperative invention, of course, does not satisfy the requirement of 35 U.S.C. 101 that an invention be useful.")*

Claims 21, 27, 61, 65, 74 and 78 recite the limitations of a magnetization current or charge "distribution" having an accelerated motion with "superluminal" speed, or "through the speed of light", or "moving with a speed exceeding the speed of light in vacuo", the term "distribution" here understood in the art as being of the same nature as its members, i.e., the magnetization current or charge, which is a material object prohibited by the law of nature to have a speed exceeding that of light in vacuo. As already stated in the previous office action, such a violation of physical law(s) renders the claim incredible when interpreted in the light of the specification, and hence, are not supported by any utility, whether well established or specifically asserted utility.

Insofar the examiner can ascertain from Exhibits A-D and the pertinent discussion, what applicant really means with a "*distribution*" having "*superluminal speed*" is no other than the phase of a (sinusoidal) voltage applied to the elements of a phased array under a specific condition that is well known in the art as a condition for beam forming/steering. To proceed with this office action, all limitations regarding charge or current distribution moving with "*superluminal speed*" are interpreted by the examiner as being identical to the condition for a phased array operating in a beam forming/steering mode. In this regard, there is no evidence that applicant's invention is distinguished from a conventional phased array antenna. Applicant's supporting Experimental Evidence (Exhibit A & D) fails to provide any evidence whatsoever (see later paragraph 43). Detailed technical background underlying this examiner's interpretation is described in later paragraphs and sections.

The independent claims 21 and 61 having been rejected under §101, all claims dependent thereof, i.e., claims 22-28, 30-32, 36-44, 50-56, 58-60 and 62-71 are also rejected under the same paragraph.

14. Claims 36 and 68 are rejected under 35 U.S.C. 101, because they are either incredible or inoperative, or both.

Claims 36 and 68 are deemed inoperative and incredible in light of general knowledge in the art, since it has been shown that the decay characteristic as claimed is produced by a conventional phased array that has been specifically disclaimed by applicant. Furthermore, since applicant's device basically is no other than conventional a phased array antenna operating in the beam steering mode (see later paragraph/section 43), the device is factually incapable of producing the claimed result, specifically regarding the limitation "*without significant attenuation*". In the contrary, Applicant's phased antenna array --as shown by applicant's Experimental Evidence, Exhibit A-- is even less efficient (i.e., more attenuated) than a conventional ~ $1/r^2$ radiation, since the ratio i_C/i_0 in reference to Figs. 11(a) to (d) of Exhibit D is obviously less than unity (see later section 43).

Regarding this ratio i_C/i_0 (or P_{cusp}/P_{sub}) being smaller than unity, Applicant's ***new argument*** brought up in the 05/18/2005 Remarks on pg.17, section C(b), and in the pertinent Appendix, pg.26, lines 4-9 from bottom, reciting

> *"The fact that the measured values of P_{cusp}/P_{sub} are smaller than unity in Exhibit D does not mean that our antenna has a low directive or power gain. It means that the particular realization of the invented apparatus that is used in the reported experiments*

generates a weaker polarization current when run superluminally than when it is run subluminally"

is deemed unpersuasive, because Applicant has provided neither **reason** nor **evidence** for such a weaker polarization current. One of ordinary knowledge in the art does not see any reason, why using the same apparatus the antenna generated a weaker polarization current: Since the polarization current in each antenna element having a dielectric constant ε is proportional to $\varepsilon \cdot \partial E/\partial t$, and the electric field E is proportional to the voltage applied by the apparatus (generator) in succession with a definite time interval, the polarization current generated in the antenna elements having the same dielectric constant ε must be the same in the (imaginative) superluminal as well as subluminal case.

It is well-known in the art, one can *always try to justify a failure by presenting a reason. However, such an attempt can not substitute an evidence for success.*

It is to be strongly emphasized that the ratio P_{cusp}/P_{sub}, which is conventionally defined as Antenna Gain, G, is a key parameter in wireless/free-space communications crucial for determining the required emitter power to achieve a desired bit-error-rate according to the "Link Budget", as described in [Souw] on pg.3153, Appendix F, Eqs. 43-45. An antenna gain G= P_{cusp}/P_{sub} smaller than unity, as established in Applicant's experiment, is essentially **USELESS** by the very literal meaning of the word, since RF antennas conventionally used in wireless communications have gains much larger than unity. This uselessness reinforces the lack of utility basis for the claim rejections imposed in this Office Action.

In this regard, conventional phased antenna array has been designed, demonstrated and routinely operated for distances up to 100 km (see, e.g., Polishuk et al. (see previous Office Action) and Kim, US-PGPUB 2001/0046840, sect. [0005], [0007], [0012]). More specifically, Bosch et al. (USPAT 5,839,053) discloses an RF antenna having a minimum antenna gain of 25 dBi (i.e., equivalent to $P_{cusp}/P_{sub} > 316$!) for use across a link distance of 250-400 km ! Therefore, there is no justification to restrict experimental data only to 900 m or less, as done by Applicant, so far. All what Applicant needs to do is to prove that Applicant's phased array performs better than conventional arrays (i.e., $P_{cusp}/P_{sub} > G_{conventional} >> 1$) up to 100 km distance.

15. Claims 25 and 76 are also rejected under 35 U.S.C. 101 because they recite limitations that are inoperative, and hence lack utility.

Claims 25 and 76 add the limitation of "*a circle or arc of a circle*", i.e., a curvature, to the array in parent claims 21 and 72, respectively. However, as shown in a later section, while also being supported by numerous articles from the scientific community, the claimed radiation behavior is known in the art as an inherent property of a phased array in beam steering mode, and hence, already encompassed in the parent claims alone.

Conventional phased array in the form of a circle or arc of a circle as depicted in Fig.1 of the disclosure, or any shape on an arbitrarily curved surface, is well known in the art as conformal phased array (patch) antenna, as conventionally used on the (curved) body of airplanes. See, e.g., (a) B. Wierig, "Conformal Array Research at

FGAN", COST 284 MCM and Workshop, JINA 2002, Nice France (01/28/2002); (b) Raffaelli et al. "Analysis and measurements of conformal patch array antenna on multiplayer circular cylinder", COST 260 Groups Meeting in Gothenburg (May 2-5, 2001); and (c) AFRL's Sensors Directorate, "Conformal Array Antenna Technology", <http://www.afrlhorizons.com/Briefs/Feb04/SN0310.html>. A *prior art* for cylindrical or circular arrays as a well-known fact is given by Raguenet et al., as recited in Col.9/ll.46-34 in reference to Fig.9, and another *prior art* for conformal arrays is given by Alden et al., as recited in Col.6/ll.63-68 in reference to Fig.5.

It is well known in the art that the intensity behavior of conformal phased array antennas is fully conventional, i.e., spherically decaying for $r \rightarrow \infty$. Also, there has been no "cusp" or similar non-conventional or extra-ordinary property ever observed and reported. Therefore, the claim limitation (i.e., a circle or arc of a circle) literally *does not operate to produce the results claimed by the patent applicant*, i.e., a non-spherical decay behavior of the radiated intensity (see also sections 17 and 27). Being incredible and inoperative, claims 25 and 76 do not have any specific asserted utility (MPEP § 2107.01/II). The lack of well-established utility of applicant's experimental array design will be discussed in detail in a later section 43.

Despite the lack of well-established and/or specific utility, applicant is of course allowed to make his antenna array as crooked as desired. Therefore, prior art rejections will still be made regarding claims 25 and 76.

16. Claim 57 is rejected under 35 U.S.C. 101 because it is inoperative and therefore lacks utility.

Claim 57 recites a means for generating "*a current or charge distribution ... without a phased array antenna.*" However, the particular antenna described in the disclosure (Fig.1) is understood by one of ordinary skill in the art as being no different and nothing else than a phased array antenna. The curvature of the array and the DSB/SC modulation thereby used do not distinguish applicant's claimed invention from the conventional phased array antenna operated in a beam forming/steering mode, as evidenced by the examiner's back-of-the-envelope calculation (see later) and in agreement with general finding in the scientific world (e.g., A. Hewish in Mon. Not. R. Astron. Soc. 280 (1996), hereinafter [Hewish'1996], Science Vol.301, No. 5639, 09/2003, pp.1463-1465, hereinafter [Science'2003]), [PhysicsWeb'2004], and etc.). As described previously, even if an array is excited by a single pulse successively applied to the array elements one after another, in such a manner so as to give a virtual impression of "superluminally moving distribution", it is still a phased array antenna by the literal meaning of the words. Thus, claim 57 is deemed inoperative, since it cannot possibly operate otherwise than as a phased array antenna.

Since there is no alternative possibility of interpreting the claim limitation in light of the specification to be other than a phased array antenna, which is specifically disclaimed by applicant, claim 57 is no further examined on the merit.

17. Claims 67-71 depend on previously rejected claim 61. Consequently, claims 67-71 are also rejected along with their parent claim under 35 U.S.C. 101.

Claim Rejections - 35 USC § 112 / 1st paragraph

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

18. Claims 21, 25, 27, 36, 57, 61, 65, 68, 74, 76 and 78 are jointly rejected under 35 U.S.C. 112, first paragraph. Specifically, since the claimed invention is deemed inoperative, and hence, not supported by either a specific asserted utility or a well established utility for the reasons set forth above (see previous §101 rejections: *"An inoperative invention, of course, does not satisfy the requirement of 35 U.S.C. 101 that an invention be useful."* MPEP § 2107.01/II), one skilled in the art would not know how to use the claimed invention. As such, the claims are defective under 35 U.S.C. 112, first paragraph.

To proceed with this office action, all limitations regarding charge or current distribution moving having "*superluminal speed*" are interpreted by the examiner as being identical to the condition for a conventional phased array operating in a beam forming/steering mode, whereas the term "*accelerated to superluminal speed*" is understood in the art as being identical to the conventional condition for beam scanning and/or beam focusing, as already well known in RF and optical communications. There

is no evidence whatsoever that applicant's invention is distinguished from a conventional phased array antenna.

19. The independent claims 21 and 61 having been rejected under §112/¶.1, all claims dependent thereof, i.e., claims 22-28, 30-32, 36-44, 50-56, 58-60 and 62-71 are also rejected under the same paragraph in conjunction with the previous § 101 rejections.

20. Claims 27 and 78 are also rejected under 35 U.S.C. 112, 1st paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 27 and 78 are both based on a non-enabling disclosure due to a contradiction found between the definition, description and derivation of a cusp, as given in the disclosure, and the experimental data (see "Evaluation of Applicant's Experimental Data" in previous Office Action), as well as between the disclosure and the general knowledge in the art, as described in a previous Office Action; the contradiction effectively result in a strong doubt regarding the existence (which depends on a proper definition and interpretation of what is meant by a "cusp"), and more importantly, the advantages of such a "cusp" .

21. Claims 28, 37, 44 and 66 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

Claims 28, 37, 44 and 66 recite a means or method for focusing the pulse of radiation generated by applicant's invention, such means or method being completely absent from the disclosure, nor are they well known the art.

To proceed with the examination, the means or method for focusing the pulse of radiation generated by applicant's invention is specifically provided by forming a "cusp", the latter being supposedly a unique result of the array curvature. However, there is no evidence whatsoever, whether or not such a cusp really exist. Therefore, claims 28, 37, 44 and 66 are also rejected under 35 U.S.C. § 101. In this case, applicant's experimental evidence (Exhibits A, D) does not provide any convincing or persuasive evidence, either (see previous Office Action, section 43). Furthermore, it would be a New Matter if the specific antenna structure is incorporated in the disclosure.

Another possible interpretation of applicant's "focusing" effect would be an alleged result of (non-existent) "radial acceleration", such as a circular "superluminal motion" around the cylinder surface depicted in Fig.1 of the disclosure. Such a circular excitation of cylindrical arrays are well known in Conformal Phased Arrays, as described previously in section 11 under 35 U.S.C. 101 rejection (see also sections 15 and 31).

22. Claims 28 and 79 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

Claims 28 and 79 recite the limitation of a "*synchrotron*", which is known in the art as a vacuum device containing an energetic beam of *real charged particles* that cannot be accelerated to superluminal speed because of its real mass and its inevitable violation of the causality principle. A charge "distribution" that does not represent the charge itself and evidently also radiates is known in the pertinent art as plasma wave; the pertinent plasma can thereby be either electrically uncharged or effectively charged. The condition for an imaginative "superluminal velocity" V_d applied to plasma waves is understood in the art as being a condition to be satisfied by the phase velocity of the plasma wave, the latter may well exceed c, as governed by the pertinent dispersion equation (but not worth to mention). In the alternative, the "superluminal" motion of the plasma distribution may be also referred to the group velocity of a plasma wave, apart from the question, whether or not a "superluminal" group velocity is possible with regard to the Special Theory of Relativity. The bottom line is, plasma wave is not a subject matter of applicant's invention. It would be New Matter if introduced hereafter.

Whichever interpretation applicant's charge "distribution" may be assigned to, a synchrotron as recited in claims 28 and 79 is essentially no other than some form of plasma filled waveguide with an unspecified provision that would allow the radiation to come out. In its broadest interpretation, applicant's synchrotron waveguide may be a partially-open waveguide, in which the plasma may be only partially enclosed, or better still, it may be some kind of plasma stealth antenna that emits highly directive radiation similar to a phased array antenna (see <http://www.aeronautics.ru/plasmaantenna.htm> and <http://iron-eagles.tripod.com/articles/active.htm>). Whatever the plasma wave

might be, the specific features of the synchrotron waveguide and the particular manner how to produce the plasma, and more importantly, how to generate and manipulate the plasma waves to acquire certain properties (e.g., its phase or group velocity) commensurate with the utility inherent to the claimed invention, are not enabled by the disclosure.

Consequently, claims 28 and 79, and hence, also claims 31-32 dependent thereof, are not further examined on the merits and excluded from all following office actions and final rejections.

23. Claims 28 and 79 are also rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

Although claims 28 and 79 inherently have a well-established utility that does not need to be specifically asserted in the disclosure, the specific features of the synchrotron waveguide, the particular manner how to produce the plasma, and more importantly, how to generate and manipulate the plasma waves to acquire certain properties (e.g., its phase or group velocity) commensurate with the utility inherent to the claimed invention, are not enabled by the disclosure. In particular, the huge gap between the vague idea of a "synchrotron" and any possible working apparatus, the latter not generally known in the art, inevitably points towards a disclosure that is non-enabling.

Consequently, claims 28 and 79, and hence, also claims 31-32 dependent thereof, are not further examined on the merits and excluded from all following office actions and final rejections.

24. Claims 28 and 79 are also rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling.

Although the claim limitation does not violate any known law of physics, the specific features of the synchrotron waveguide and the particular manner how to produce the plasma, and more importantly, how to generate and manipulate the plasma waves to acquire certain properties (e.g., its phase or group velocity) commensurate with the utility inherent to the claimed, all of which critical or essential to the practice of the invention but not included in the claim(s), are not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976)].

Consequently, claims 28 and 79, and hence, also claims 31-32 dependent thereof, are not further examined on the merits and excluded from all following office actions and final rejections.

25. Claims 28, 66, 72, 79 and 80 are also rejected under 35 U.S.C. 112, 1st paragraph, as failing to comply with the written description requirement. The claim contains a subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 28, 66, 72, 79 and 80 recite various limitations regarding "far field", "near field" or "near zone", in relation to the Fresnel distance, the latter being known in the art as defined by Eq.2 of previous Office Action. However, the relationship defined by applicant proves to be incorrect by many multitudes (see Eq.7 in section 43 of previous office action). Furthermore, non-spherically decaying component is inherent in light

beams resulting from collective interference, such as laser beams and directional beams generated by phased arrays, as described below.

Specifically in relation to claim 72, it is true that laser radiation decays spherically in the "far field", but only if the distance is measured from the beam waist (see Eq.3 in Melles-Griot <http://beammeasurement.mellesgriot.com/tut_gaussian_beam_prop.asp>, "Laser Beam Measurement", hereinafter [Melles'Griot]). However, if the distance is measured from the collimating optics, the intensity decay behavior is non-spherical ($\sim 1/r^x$ with $x<2$) up to (many) multiples of the Rayleigh range. This is a fact well-known even to those only minimally skilled in the art, such as physics major undergraduates, and can be easily demonstrated by substituting the distance variable z in the conventional formula for Gaussian beams (which is conventionally measured from the beam waist) with a distance z' measured from the collimating optics $z'=z+f$, with f being the focal length of the collimating optics, resulting in a decay behavior that has a non-spherical component $1/r^x$. The non-spherical behavior can also be seen by plotting the intensity ratio as a function of this new distance variable z', i.e., $I(z')/I_0(z') = I(z')/(1/z'^2)$. The effect is more pronounced if the beam is focused. As can be easily discerned by one skilled in the art, such a non-spherical decay behavior is indicated in a figure on pg.5 of [Melles'Griot] for focal lengths up to 4 times the Fresnel or Rayleigh distance z_R. As known in the art, there is no theoretical limit for the z_R/f ratio that dictates such a behavior (but only practical limit).

26. Claims 36-43 and 50-55 are also rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling.

Claims 36-43 and 50-55 recite a means for generating a *broadband* radiation. While the experimental data (Exhibits A & D) using conventional antenna excitation at a carrier frequency (with or without modulation) does not to show any broadband radiation, under special circumstances described in the specification the device of the parent claim 21 may indeed generate a broadband radiation spectrum, i.e., in case the charge or current distribution consists of a single pulse of short duration δt, which is known in the art to produce a "shock wave" of electromagnetic radiation propagating in vacuum or free space (comparable to "sonic boom" in the atmosphere). However, as known in the art, the radiation emitted by such a shock wave is governed by the uncertainty principle relating the pulse duration, δt, to the radiation bandwidth, δv, i.e., $\delta v \cdot \delta t \approx 1$, such that their characteristics (Fourier spectrum) is hardly controllable (see, e.g., Bliznetsov at <www.cosis.net/abstracts/EGS02/00137/EGS02-A-01137.pdf>). A specific method to control the characteristics of the emitted *broadband* radiation in order to realize the utility as claimed, is not enabled by the disclosure nor recited in the claims.

Furthermore, claims 36-43 and 50-55 recite limitations inherently involving a process of transmitting a message that is useful to a recipient. However, a specific modulation technique to encode a desired message into the specific type of *broadband* radiation generated by applicant's device is not described in the disclosure, nor in the claims. As well known in the art, the variety of techniques for message encoding are so

numerous, but very specific as to the type of modulation, the pulse duration and the bandwidth of the radiation. While the encoding of harmonic wave fronts is conventional (e.g., by virtue of frequency or phase modulation; see [Souw'2003] (SPIE Opt. Eng. 42(11), 2003, pp.3139-3157), to utilize a *broadband* radiation generated by a single pulse shock wave here involved, the desired modulation has to be encoded into the shock wave, e.g., directly into the excitation pulse itself, for which there is no enablement provided by the disclosure (see above); neither is there any such method generally known in the art (note, the Fourier spectrum depends not only on the pulse duration δt, but primarily also on the shape of the pulse). Under such circumstances a general and very broad limitation as recited in claims 36-43 and 50-55 does not enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. More specifically, since applicant has failed to disclose the specific method to generate the shock wave and control the characteristics of the radiation in view of the uncertainty principle and/or Fourier transform, it would be even more impossible for one of ordinary skill in the art to devise a method to encode a desired message into such a radiation.

In summary, the specific technique of generating a *broadband* radiation by means of a shock wave and to control the radiation characteristics in view of the uncertainty principle and/or Fourier transform, and the specific modulation technique used to encode a desired message into the unspecified and uncontrollable *broadband* radiation, both of which are critical or essential to the practice of the invention but not

included in the claim(s), are not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976)].

Consequently, claims 36-43 and 50-55 are not further examined on the merits and excluded from all following office actions and final rejections.

27. Claims 36-43, 50-55 and 69-71 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 36-43, 50-55 and 69-71 recite limitations that inherently involve a process of transmitting a message useful to a recipient. However, the specific technique thereby used, or that can be used, to encode a desired message into the specific type of radiation generated by applicant's device is not enabled by the disclosure, nor by the claims. As well known in the art, the techniques of signal modulation to encode a message are so numerous, but very specific as to the type of modulation and the transmitting/receiving antenna, so that a general and very broad limitation as recited in claims 36-43, 50-55 and 69-71 do not enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. For more specific description of modulation techniques conventionally used in communications, please refer to [Souw'2003].

Consequently, claims 36-43, 50-55 and 69-71 are not further examined on the merits and excluded from all following office actions and final rejections.

28. Claims 36-43, 50-55 and 69-71 are also rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 36-43, 50-55 and 69-71 recite limitations inherently involving a process of transmitting a message that is useful to a recipient. However, a specific technique to encode a desired message into the specific type of radiation generated by applicant's device is not described in the disclosure, the specific problem (e.g., uncertainty principle, Fourier transform) has not even been identified, which consequently raises doubt as to applicant's possession of the claimed invention at the time of filing.

29. Claim 57 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 57 --which depends on the previously rejected claim 52-- recites a means for generating "*a current or charge distribution ... <u>without</u> a phased array antenna.*" However, the particular antenna described in the disclosure and specifically described

in Exhibits A & D is understood by one of ordinary skill in the art as being no different and nothing else than a phased array antenna. The curvature of the array and the DSB/SC modulation thereby used do not distinguish applicant's claimed invention from the conventional phased array antenna operated in a beam forming/steering mode, as evidenced by the examiner's back-of-the-envelope calculation (see section 43) and in agreement with the general finding in the scientific world (e.g., [Hewish'1996], [PhysicsWorld'2000], [PhysicsWeb'2004], and [Science'2003]), as previously recited. Therefore, claim 57 seems to be in direct contradiction to the claimed invention, unless something else is thereby meant, which is neither adequately described in the disclosure, nor particularly pointed out and distinctively claimed by the recited limitation.

Since there is no alternative possibility to interpret the claim limitation in light of the specification other than a phased array antenna, which is specifically disclaimed by applicant, claim 57 is no further examined on the merit, and is additionally rejected under 35 USC 101 as being "inoperative", because it cannot possibly operate otherwise than as a phased array antenna. As described previously, even if an array is excited by a single pulse sequentially applied to the array elements in such a manner so as to give a deceptive imagination of a spatial distribution of charge carriers that is moving with "superluminal velocity", as claimed by applicant, such an array is still a phased array antenna (operating in a pulsed mode) by the literal meaning of the words.

30. Claims 60, 61 and 72 are also rejected under 35 U.S.C. 112, 1st paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter

which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 60, 61 and 72 recite the terms "far field", "near field" or "near zone", "Fresnel distance", and/or a non-spherically decaying radiation intensity characterized by a $1/R^x$ dependence with $x<2$. As described in the previous Office Action and in section 25 of this Office Action (regarding claims 28, 66, 72, 79 and 80), the radiation decay characteristics as claimed has been proven to be inherent to many conventional light sources, such as --at least, but not restricted to-- a laser beam and a beam steered by a phased array. Therefore, applicant's claim of such characteristics being typically generated by the claimed device by means of a mechanism as claimed in the specification, while implicitly ***disclaiming*** every conventional means, must be deemed "non-enabled".

Claim Rejections - 35 USC § 112/ 2nd paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

31. Claims 21, 27, 61, 64 and 65 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is not clear what is meant by *"accelerating"* the current or charge distribution recited in the claims, i.e., whether this acceleration is in the direction of the array, or perpendicular to it, i.e., in the direction of array's radius of curvature.

In terms of the disclosed excitation of many (array) source elements as an imaginative motion of a fictive single-element source, one of ordinary skill in the art would tentatively interpret the recited "*acceleration*" as nothing else than a conventional beam forming/scanning/focusing by a phased array. Under such an interpretation, the resulting beam forming/scanning/focusing effect is real. However, in another embodiment Applicant also maintains that a curved array would experience a "*centripetal acceleration*" (which is -of course- does not exist because in reality there is no motion whatsoever). In this second interpretation, the imagined effect is unreal and does not exist.

Regarding claims 21, 27, 61, 64 and 65, the results would be fully different (one real and does exist, the other unreal and does not exist). Therefore, the pertinent claims are indefinite, since one of ordinary skill in the art really does not know what -in fact- is meant by the term "*acceleration*".

To proceed with this office action, all limitations regarding charge or current distribution that is "accelerated to superluminal speed" is understood in the art as being identical to the conventional condition for beam scanning and/or beam focusing well known in RF and optical communications as well as in medical ultrasound technology. In this case, the acceleration is in (i.e., along) the array direction, as described in Frequency/Phase Effects of Antennas, <http://www.keys.com/antenna/navy/freq-

phase/freqphas.htm>, by Somer in "Phased Array and J. Somer", <http://www.ob-ultrasound.net/somers.html> and by Montebugnoli et al., in "Some Notes on Beam Forming", <http://www.ira.cnr.it/~skawork/documents/Beamforming-Eng.pdf>.

For a real-time demonstration as to how "*acceleration*" gives rise to beam-steering/scanning and/or beam-focusing, please refer to, e.g., [Phased Array Principle], available at the website URLs: <http://www.imasonic.com/Industry/PAprinciple.php> and < http://www.imasonic.com/Industry/PA3D.php>.

The method(s) of acceleration assumed by the examiner may be different than what applicant would like to mean, but the term "*beam forming/scanning/focusing*" is generally known in the art as being no other than the specific method(s) of array excitation described in the references cited above. On the other hand, a "*radial acceleration*" allegedly generated by applicant's curved array, either according to Fig.1 of the disclosure or according to Exhibits A and D (note the difference to the original disclosure) does not generate any focused radiation, but only beam-formed directional radiation. Curved arrays similar to applicant's disclosure are well known in the art as Conformal Phased Arrays, as described in reference articles previously cited, i.e., Wierig, "Conformal Array Research at FGAN", and Raffaelli et al. "Analysis and measurements of conformal patch array antenna on multiplayer circular cylinder". A full cylindrical array similar to applicant's Fig.1 is also depicted by Wierig on pgs. 3 and 4 (top right hand corner). A further evidence for cylindrical arrays as well-known fact is given by Raguenet et al., as recited in Col.9/ll.46-34 in reference to Fig.9, whereas

conformal arrays as a well-known fact is given by Alden et al., as recited in Col.6/ll.63-68 in reference to Fig.5.

As understood by those skilled in the art, none of the cylindrical/circular and conformal patch antenna references ever mentioned the word "*superluminal*", although their method of applying the excitation signals is substantially no different than applicant's. Various forms of conformal phased arrays have been being routinely operated as well as experimentally and theoretically investigated all over the world for at least 37 years (e.g., Brennan et al. USPAT 4,146,889, conformal; Fassett et al. USPAT 3,940770, cylindrical ; Lockerd et al. USPAT 3,750175 ; 3,750,175, conformal ; Hatcher et al. USPAT 3,568,208, conformal). However, none of them ever reported to have observed any *extra-ordinary* or *non-ordinary* effect, including anything like a less-attenuated *non-spherical decay behavior*, but nothing else than highly directional beam-formed radiation having *conventional properties* and *conventional decay* behavior.

Furthermore, their directional radiation is emitted in the (r,φ) plane, but not in the (φ,z) plane as claimed in applicant's invention (Fig.4 of the disclosure). Therefore, applicant's "acceleration" must be either (a) something *indefinite* and unknown in the art, and hence, falls under present §112/¶.2 rejection, or (b) inadequately described in the disclosure, thus falling under §112/¶.1 rejection based on a *non-enabling disclosure*, or (c) non-existent, and hence, *inoperative and incredible* under §101 (see previous sections 11 and 17).

32. Claim 36 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for reciting the limitation "*over long distances without significant attenuation*". Similarly, claim 68 is also rejected under the same paragraph for reciting the limitation "*over distances with an attenuation lower than a distance defined by an inverse square law*".

The metes and bounds of the claimed subject matter, i.e., "*long distances*" and "*significant attenuation*" as well as "*distances with an attenuation lower than a distance defined by an inverse square law*" cannot be determined. The specification does not give definite criterion regarding what "*distance*" is defined as "*long*" and what attenuation is defined as being "*significant*". Similarly, the specification does not give definite criterion regarding what is a "*distance with an attenuation lower than a distance defined by an inverse square law*".

In order to proceed with this office action, the claim limitation is assumed to be comparable to that of laser beams and formed/steered beams from phased arrays, which are well known in the art as representing examples of radiation signals that propagate "*over long distances without significant attenuation*". This interpretation agrees with the attenuation measured in applicant's experiment (Exhibits A & D), as described previously. According to the general knowledge in the art, such a distance is estimated to about 10-80 km, and not necessarily equal to the Rayleigh distance, as already recited in the previous (11/30/2004) Office Action, section 43(h) on page 77:

> *"Obviously, applicant's reference to "non-spherically decaying component" in relation to Rayleigh range as a threshold between near-field and far-field regimes is incorrect and has to be revised, as expressed by J. Hannay cited in (PhysicsWeb'2004) (last sentence), and by A.. Hewish, cited in Science Vol.301, No. 5639, 09/2003, pp.1463-1465*

(hereinafter (Science'2003)), both reciting that a range of 10-80 km is more likely needed to test the ~1/R^2 intensity decay, instead of a mere 900 m range measured in applicant's experiment."

In this regard it is important to note that conventional phased antenna array has been designed, demonstrated and routinely operated for distances up to 100 km (see, e.g., Polishuk et al. and Kim (US-PGPUB 2001/0046840 sect. [005], [0007], [0012]). Therefore, there is no reason to restrict experimental data only to 900 m or less, and then draw conclusions from its extrapolation, as done by Applicant, so far. All what Applicant needs to do is to prove that Applicant's phased array performs better than conventional arrays up to 100 km distance.

There is no evidence whatsoever that applicant's radiation is less attenuated than the two specific types of radiation cited above by the examiner. In the contrary, the experimental data provided in Exhibits A & D, Figs.11(a) to (d), showing signal intensities significantly smaller than r^{-2} decaying radiation ($i_C/i_0<1$), justifies the examiner's interpretation of the indefinite claim.

Claims 36 and 68 are deemed indefinite under 35 U.S.C. §112/¶,1 insofar as Applicant persistently (but incorrectly) maintains the effective distance where a radiation *ultimately* turns into spherical or inverse-square-law decay would be <u>*equal*</u> to the Rayleigh or Fresnel distance, since non-spherical decay may extend to large multiples of the Rayleigh or Fresnel distance, while also depending from the (definition of the) origin of the distance measurement, such that one of ordinary skill in the art really does not know, what in fact is meant by Applicant with the terms "*long distances*", "*significant attenuation*" and "*distances with an attenuation lower than a distance defined by an*

inverse square law". See last Office Action on pgs.77-78, citing Hewish [Hewish'1998, pg.L28] that for a linear phased array as Applicant's, the effective distance where a spherical decay would start is much larger than the Fresnel distance; and further, last Office Action pgs.86, citing both Hannay [PhysicsWeb'2004] and Hewish [Science'2000] that the spherical decay behavior would expectedly start at about 10-80 km.

33. Claim 37 is also rejected under 35 U.S.C. 112, second paragraph, as being indefinite for reciting the limitation "*focused at a specific region of interest, distant from the antenna*". The metes and bounds of the term "*distant*" cannot be determined. The specification does not give definite criterion regarding what is defined as being "*distant*" from the antenna.

In order to proceed with this office action, the claim limitation is assumed to be comparable to the focusing capability of laser beams and formed/steered beams from phased arrays, which are well known in the art as representing examples of radiation signals that can be "*focused at specific region of interest, at some distant from the antenna*". There is no evidence whatsoever that applicant's radiation is focusable at regions more distant from the antenna than the two specific types of radiation cited by the examiner.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C.103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

34. Claims 21, 60, 61, 64 and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koscica et al. (USPAT 5,617,103)

Koscica et al. discloses an apparatus for generating electromagnetic radiation as expressly recited in Col.1/ll.38-49 and Col.2/ll.3-11, comprising a polarizable or magnetizable medium 65-68 (ferroelectric components), as depicted in Fig.6 and recited in Col.5/ll.8-16, the ferroelectric components 65-68 with conductor patch 60-63 shown in Fig.6 and Fig.7 forming the elements of a phased array antenna in Col.1/ll.38-49 and Col.2/ll.3-11; and means 50-51 shown in Figs.4-5 via lines 70-73 shown in Fig.6 of generating a polarization or magnetization current distribution as recited in Col.5/ll.1-7 and Col.5/ll.12-16, respectively, whose "distribution" --or more precisely and correctly, the relative phase of the distribution, as described in previous sections of this office action-- moves with a *superluminal* speed, which is inherent in Koscica's because Koscica's antenna array is inherently made for beam steering, as recited in Col.1/ll.38-49 and Col.2/ll.3-11, wherein the "speed" of the charge "distribution", or more precisely, its relative phase, inherently moves with superluminal speed, or exceeding the light speed in vacuo, which is generally understood in the pertinent art as being the conventional method of steering the beam using a phased array (as described in Fig.1B of previous Office Action), and wherein the limitation of *accelerating* the "distribution" or phase is understood in the art as having the same meaning as "*beam focusing*", which is an inherent capability of Koscica's device, as expressly recited in Col.1/ll.21-27 and

45-49, and wherein a non-spherically decaying electromagnetic radiation is inherent to a focused beam in general, as quantitatively demonstrated by the examiner's back-of-the-envelope calculation presented in the previous Office Action, sub-paragraph 43(j).

Specifically regarding claim 64, changing the speed of the phase velocity results in scanning or steering the beam, as recited in Col.1/ll.38-49 and Col.2/ll.3-11.

Specifically regarding claims 60 and 72, Koscica et al. does not *explicitly* recite generating electromagnetic radiation whose intensity attenuates at a rate of $\sim 1/R^x$, where R is a distance from the current/charge distribution and x is less than 2. However, in view of the previously imposed §112/¶.1 rejections of claims 28, 66, 72, 79, 80, and 60, 61, 72, a decay rate of $\sim 1/R^x$ in the "far field" with $x<2$ is known in the art as being inherent to a radiation generated by collective interference, such as laser beams and directional beams steered by phased arrays. As generally known in the art, this property is even more pronounced in focused laser beams, focused phased arrays, as well as infinitely long linear arrays.

It would have been obvious to one of ordinary skill in the art by the time the invention was made to produce a directional beam steered by Koscica's phased array, since a steered beam has a high directional preference, and hence, a higher antenna gain.

One of ordinary skill in the art would have been motivated to focus Koscica's steered beam, in order to have highly concentrated beam intensity at a localized spot on the target.

35. Claims 70 and 71 are rejected under 35 U.S.C.103(a) as being unpatentable over Koscica et al. in view of Martin et al. (USPAT 6,061,562) or Karlsson et al. (USPAT 6,034,634).

Koscica et al. shows all the limitations of claims 70 and 71, as previously applied to claim 61, except the recitation of using the phased array for Internet and television communications. These limitations are rendered obvious by Martin et al., as recited in Col.1/ll.13-16 (Internet) and Col.1/ll.21-26 (television), also by Karlsson et al. as recited in Col.5/ll.25-30 (Internet) and Col.1/ll.10-15 (television).

It would have been obvious to one of ordinary skill in the art by the time the invention was made to use Koscica's highly directional beam for Internet and/or TV communications, in order to have a higher antenna gain.

One of ordinary skill in the art would have been motivated to use Koscica's steered beam for Internet and/or TV communications, as taught by Martin et al. or Karlsson et al., in order to have a higher signal to noise ratio.

36. Claims 22-24, 26, 27, *36*, 37, *40-43*, 44, 56, 58, 59, 62, 63, 65, 66, 73, 74 and 78 are rejected under 35 U.S.C.103(a) as being unpatentable over Koscica et al. in view of Shapiro et al. (USPAT 5,043,738) or O'Neill, Jr. (USPAT 5,969,681).

► Koscica et al. shows all the limitations of claims 22, 24, 26, 63 and 73, as previously applied to claims 21 and 61, except the recitation that the polarizable or magnetizable medium is a dielectric substrate. Shapiro et al. discloses an apparatus 20 shown in Fig.1 for generating electromagnetic radiation, comprising a dielectric

substrate 28, as recited in Col.3/ll.54-67. Alternatively, O'Neill also discloses an apparatus 20 shown in Fig.2(a) and Fig.2(b) for generating electromagnetic radiation, comprising a dielectric substrate 26, as recited in Col.5/ll.62-67.

It would have been obvious to one of ordinary skill in the art to use a dielectric substrate as polarizable medium for an antenna as taught by Shapiro et al. or O'Neill, since a dielectric can also be serve as antenna radiator by virtue of its displacement current, such an antenna device known in the art as patch antenna.

One of ordinary skill in the art would have been motivated to make Koscica's antenna in the form of a patch antenna, since a patch antenna has a low profile suitable for making a surface-mounted array, the latter being desirable for use on the fuselage of an airplane.

► Regarding claims 23 and 74, O'Neill's array is recited in Col.6/ll.3-7, whereas Shapiro's array 124 shown in Fig.8 is made of array element 126, each of which is the same as antenna element 20 shown in Fig.1 which is made of electrode pairs 24-48 and 24-50 positioned opposite to each other along the medium 28, as recited in Col.11/ll.38-44; a voltage generator shown in Fig.9 for applying a voltage to the electrodes 126, as recited in Col.12/ll.16-26, wherein the limitation of "*sequentially at a rate sufficient to induce a polarization current in the medium whose distribution pattern moves along the medium with a speed exceeding the speed of light in vacuo*" is inherent in phased arrays operated in beam steering mode, as described in the previous Office Action, wherein the word "*sequentially*" is understood in the art as being a time delay applied to the phase of the individual element of the array, whereby the voltage may be applied

either periodically and continuously, or only one time sequentially; the latter resulting in a single wave front known as a shock wave, which is a more general case recited in applicant's disclosure, both cases having been already explained in the previous Office Action.

► Specifically regarding claims 24, 63 and 75, the limitation that the spectrum of the generated radiation contains frequencies that are higher than the frequency needed for generating the current or charge distribution and its modulation is rendered obvious by Shapiro et al., as recited in Col.1/ll.44-46, and by O'Neill as recited in Col.1/ll.7-48, since in both Shapiro's and O'Neill's the antenna array is used for transmitting communication signals at a carrier frequency, this carrier frequency being inherently modulated by a modulation signal representing the inherent communication code, thus generating a radiation that inherently contains the sum frequency of the carrier frequency and the modulation frequency, a sum frequency being inherently (i.e., per definition) higher than the carrier and the modulation frequencies.

► Specifically regarding claims 26 and 77, Shapiro's dielectric medium 28 has a rectilinear shape, as can be seen in array element 126 shown in Fig.8, each of which is the same as antenna element 20 shown in Fig.1. Similarly, O'Neill's dielectric medium 26 shown in Fig.2(b) also has a rectilinear shape.

► Regarding claims 27, 37, 44, 65, 66 and 78, Koscica's means for accelerating or changing the speed of the (relative phase of the) charge distribution, as recited in Col.1/ll.21-27 and Col.1/ll.45-49, effectively focuses the beam, and inherently generates wavefronts or wavefront envelopes that possess a cusp for a specific period of time, the

cusp being understood in the art as being the meeting point for curved wavefront envelopes, as described in previous Office Action, sub-paragraph 43(e). As such, a cusp is the same as a focal point, which is inherent in Koscica's phased array, as recited previously.

► *Regarding claims 36 and 40-43, the limitation of using phased array antennas for telecommunications, including hand-held portable phones, is rendered obvious by O'Neill, Jr., as recited in Col.1/ll.14-67.*

► Regarding claims 56 and 62, a spherically decaying radiation component can be achieved by appropriate phase delay sequence in every transmitting antenna array (see Fig 1a of previous Office Action).

► Regarding claims 58 and 59, the limitation of the current/charge volume distribution being controlled by varying the applied voltage with respect to time is inherent to the use of time delay equivalent to phase delay appropriate for beam steering and/or focusing, as already described in the previous paragraph evaluating applicants experimental results.

37. Claims 50 and 53 are rejected under 35 U.S.C.103(a) as being unpatentable over Koscica et al. in view of Shapiro et al. or O'Neill, Jr., and further in view of Martin et al. or Karlsson et al..

Koscica et al. as modified by Shapiro et al. or O'Neill, Jr. shows all the limitations of claims 50 and 53, as previously applied to claim 37, except the recitation of using the

phased array for Internet and television communications. These limitations are rendered obvious by Martin et al., as recited in Col.1/ll.13-16 (Internet) and Col.1/ll.21-26 (television), also by Karlsson et al. as recited in Col.5/ll.25-30 (Internet) and Col.1/ll.10-15 (television).

It would have been obvious to one of ordinary skill in the art by the time the invention was made to use Koscica's highly directional beam for Internet and/or TV communications, in order to have a higher antenna gain.

One of ordinary skill in the art would have been motivated to use Koscica's steered beam for Internet and/or TV communications, as taught by Martin et al. or Karlsson et al., in order to have a higher signal to noise ratio.

38. Claims 25 and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koscica et al. in view of Shapiro et al. or O'Neill, Jr., and in further view of Sanford et al. (USPAT 5,243,358), or Raguenet et al. (USPAT 5,434,581) or Alden et al. (USPAT 5,045,862).

Koscica et al. as modified by Shapiro et al. or O'Neill, Jr. show all the limitations of claims 25 and 76, as applied previously to the parent claims 21 and 71, respectively, except the recitation of the polarizable medium (i.e., the antenna array) having the shape of a circle or arc of a circle.

While specific features of applicant's experimental curved array as used in Exhibits A and D are neither recited in the disclosure nor in the claims, even if they would have been incorporated (New Matter!), such features would be known in the art

as generating only minor and/or conventional modifications, distortions and/or non-homogeneities in the radiation characteristics that can be understood and analyzed by conventional physics and predicted by more rigorous calculations (see previous sections 13, 19 and 29).

Sanford et al. disclose an antenna array made of dielectric substrate in which the polarizable medium has a circular form, as recited in the abstract and shown in Fig.2. As can be seen in Fig.2, Sanford's circular array consists of annular components in the form of a circle, as recited in Col. 5/11.17-29 and Col.4111.15-26.

Conventional phased array in the form of a circle or arc of a circle (as claimed in Fig.1 of the disclosure), or any shape on arbitrarily-curved surface, is well known in the art as conformal phased array (patch) antenna conventionally used on the body of airplanes, as described by Raguenet et al. in Col.9/ll.46-34 in reference to Fig.9, or by Alden et al. in Col.6/ll.63-68 in reference to Fig.5.

It would have been obvious to one of ordinary skill in the art by the time the invention was made to form Koscica's antenna array in the form of a circular array, as taught by Sanford et al., Raguenet et al., or Alden et al., since the transmit beam formed by such an circular array has a particular beam symmetry and focusing property that would serve better a specifically desired purpose. The specific reason(s) and motivation(s) for Sanford et al., Raguenet et al., or Alden et al. to modify Koscica's may be different than what the inventor has done. However, it is not necessary that the prior art suggests the combination to achieve the same advantage or result discovered by

applicant. *In re Linter*, 458 F.2d 1013, 173 USPQ 560 (CCPA 1972); *In re Dillon*, 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990), cert. denied, 500 U.S. 904 (1991).

39. Claims 79 and 80 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koscica et al. in view of Shapiro et al. or O'Neill, Jr., and further in view of the general knowledge in the art (as described in section 23 above, specifically addressing claim 72) and Hewish, Mon. Not. R. Astron. Soc. 280 (1996), hereinafter [Hewish'1996].

Koscica et al. in view of Shapiro et al. or O'Neill, Jr. show(s) all the limitations of claims 79 and 80, as applied previously to claim 72, except the limitation of Fresnel distance as a threshold between near-field and far-field zone only assumes a vague and indefinite meaning or value, in view of the contradiction between applicant's definition and understanding, as recited in the previous §112/¶.1 rejections of relevant claims 28, 66, 72, 79, 80, and further 60, 61, 72.

40. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koscica et al. in view of Shapiro et al. or O'Neill, Jr., and in further view of Wicks et al. (USPAT 5,351,053).

Koscica et al. as modified by Shapiro et al. or O'Neill, Jr., show(s) all the limitations of claim 30, as applied previously to the parent claim 27, except the recitation of a spectrometer and a detector. Wicks et al. disclose in Fig.3, 8 and 10 a radar system using a phased array transmitter antenna that is based on frequency offset

principle, which is also well known in the art besides the more conventional principle based on phase shift or time delay as in Koscica's, Shapiro's, or O'Neill's.

It would have been therefore obvious to one of ordinary skill in the art at the time the invention was made to substitute Wick's phased array transmitter antenna with Koscica's, Shapiro's, or O'Neill's phased array transmitter antenna to have the transmitted power more concentrated on the target, in order to have a stronger target signal. Wick's receiver system comprises a spectrum analyzer, as shown at the bottom of Fig.3, 8 and 10 and recited in Co.7/ll.40-45. As known in the pertinent art, a spectrum analyzer is no other than a spectrometer for the radio frequency range. Besides the RF spectrometer, Wick's receiving system inherently makes use of a detector, since otherwise no return signal would be detected. The inherent use of detector is recited by Wick et al. in Col.2/ll.10-14,

In summary, Wick's system comprises a spectrometer (spectrum analyzer), a detector and a phased array antenna as radiation source, the latter here substituted by Koscica's, Shapiro's, or O'Neill's phased array antenna to render obvious applicant's claim 30; the reason or motivation to combine Wick's with Koscica's, Shapiro's, or O'Neill's having been recited above.

41. Claim 66 is additionally rejected under 35 U.S.C. 103(a) as being unpatentable over Koscica et al. in view of Shapiro et al. or O'Neill, Jr., and in further view of Apa et al. (USPAT 6,545,630).

Koscica et al., Shapiro et al., or O'Neill, Jr. show(s) all the limitations of claim 66, as applied previously to the parent claim 61, except the recitation of generating intense focused pulses with high frequencies in a near zone.

To generate an intense focused pulses onto a small spot is well known from the related field of ultrasound technology as used for medical therapeutic purposes, and hence, also obvious to one of ordinary skill in the art. Support for this official action is plentiful. In particular, Apa et al. disclose an apparatus for generating electromagnetic radiation similar to Koscica's, Shapiro's, or O'Neill's. However, Apa's apparatus explicitly and expressly recites to have a capability of generating intense focused pulses of high frequency radiation, as recited in Col.11/ll.42-56.

It would have been obvious to one of ordinary skill in the art by the time the invention was made to add to Koscica's, Shapiro's, or O'Neill's phased array antenna a focusing capability as taught by Apa et al., since focused radiation can be used with higher efficiency to achieve the intended objective than an unfocused collimated beam.

REPEAT of Previous Office Action: Request for Hard Evidence

42. Examiner's requests for Hard Evidence, as already identified in the previous Office Action on pgs.93-97, are re-iterated herein by this reference. This refers to three Requests, i.e., (1) Section C(c): hard evidence for a full spectrum data; (2) Section E(c+e) : hard evidence for experimental data for 10-80 km distance; and (3) Empirical observation/measurement of "cusp" intensity more efficient than spherical decaying radiation (repeated from previous Office Action, pgs.95-97). The hard evidence requested in (3) should not be provided/represented by a spurious single data point

and/or be demonstrated by mere extrapolation. Furthermore, no verbal justification of failure is accepted as a substitute for evidence of success. In this regard, experimental evidence for antenna gain (much) larger than unity has to be demonstrated (P_{cusp}/P_{sub} >1). In addition, a reinstatement of a previous Request for Eliminating Incredible Statements from the Disclosure, as stated in previous Office Action, section 43k, pgs.88-89, is here also imposed (see section 8 above).

EXAMINER'S RESPONSE TO APPLICANT'S 05/18/2005 REMARKS

43. New Submitted Figures I, II, III

The Examiner has taken the experimental data (Exhibits A-D) including its supposed support, i.e., Figs. I, II and III, into consideration. Even though, Fig.II still contains the same error as Fig.4 of the disclosure, i.e., the (direction of the emitted) radiation can neither be represented by the supplemental Fig.II nor the original Fig.4 of the disclosure, since in both cases the array or the source is *circular symmetric*. As known in the art, a circular symmetric source (without any distinguished φ coordinate) can ***not*** possibly emit radiation in a distinguished φ direction, but instead, must emit in a totally smeared φ direction ($0 \leq \varphi \leq 2\pi$). This is NOT a NEW GROUND of rejection, since it has been previously raised with regard to Fig.4 in the 11/30/2004 Office Action, section 43.e.2 on pg.68 (highlight and underline added):

> *"Otherwise, applicant has no choice except to agree with the examiner that in reality the locus of C is not a line along the z axis as illustrated in applicant's Fig.4, but* ***smeared out 2nπ-fold around the z axis****, leaving it --at most-- defined by the coordinates (θ,z) alone. This will destroy any significance of interpreting the cusp as a diffraction 'spot' ".*

In the above quotation, the wording "*the coordinates (θ,z)*" is no other than an azimuthal ($\theta=90^0$) plane already recited previously.

Even if supported by supplemental Fig.II, Applicant's experimental data does not distinguish from the Examiner's calculations based on conventional phased array, as already demonstrated in previous Office Action. As a matter of fact, every aspect of Applicant's experimental data claimed as being a unique result of Applicant's invention falls within quantitative estimates previously made by the Examiner, prior to the submission of supplemental Fig.II. Therefore, Applicant's supplemental figures I, II and III, does not alter any conclusion already made in the previous Office Action. In the contrary, and to Applicant's disadvantage, it is now discovered that the supplemental Fig.II contains a theoretical error exactly of the same nature as previous Fig.4, that has been already raised by the Examiner in the previous (11/30/2004) Office Action, section 43.e.2 on pg.68, as recited above.

> *Figure 1 is a diagram showing the wave fronts of the electromagnetic emission from a particular volume element (source point) S within the circularly moving polarized region of the polarizable medium of the present invention.*
>
> *Figure 3 is a perspective view of the envelope of the wave fronts shown in Fig. 1.*
>
> *Figure 4 is a view of the cusp curve of the envelope shown in Fig. 3.*

Applicant's realization of the *circularly moving* light source of Fig.1 is described on page 28 the specification, as originally filed, which further recites:

> *Figure 7(b) shows another example of the invention, the one analyzed above. In this example, the dielectric rod is formed in the shape of a* ***ring****.*
>
> *Figure 7(b) is a plan view showing electrodes 2, and has electrodes 3 disposed below the rod 1. For a ring of radius r and a polarization pattern that moves around the ring with an angular frequency ω, the velocity of the charged region is rω. In this example, rω is*

> *greater than the speed of light c so that the moving polarisation pattern emits the radiation described with reference to Figures 1 to 6.*

There can be no doubt to one of ordinary skill in the art that the experiment as described in Exhibits A and D refers to Fig.7(b) described in the specification, as cited above. This is because Fig. 7(a) is a straight array that does not have a curved form as required by a *circularly moving* charge around a *ring*, as recited in the specification cited above. In this regard one of ordinary skill in the art would immediately see that the geometry of the experiment described in Exhibit A and D, as well as the resulting experimental data --while they may agree with the new submitted Fig.II--, do not have any resemblance and/or relation to Figs. 1-6 as recited in the specification (see above citations). More specifically, the cusp location measured in Exhibits A and D is unambiguously in the (θ,φ) direction, but in the claimed invention the cusp location as shown in Fig.4 is unambiguously in the z direction.

Therefore, the alleged experimental support presented by Exhibit A-D does not really support Applicant's invention as originally filed.

44.A. *Applicant's Summary of Previous Office Action is Incorrect*

Applicant's summary of the previous Office Action dated 11/30/2204 (section A of Applicant's Remarks on page 11) is incorrect and misleading. Contrary to Applicant's summary, the provisional withdrawal of all rejections and objections as a result of personal interview on 04/14/2004 has been overcome and nullified by the Office Action. All the previous rejections and objections have been reinstated, since the provisional

withdrawal has been determined as being based on a insufficient, faulty evidence, and/or invalid --and hence, rejected-- arguments.

44.B. ***Regarding Lack of Useful and Enabling Disclosure***

Regarding a lack of useful and enabling disclosure, there is indeed a total incapacity of Applicant's invention, as originally filed: Contrary to Applicant's claim, Applicant has failed to provide any "*evidence that the invention is capable of performing some beneficial function of achieving some useful result*", as claimed on page 12 of the Remarks. Applicant's invention is represented by a single independent claim 1, reciting an "apparatus that generates non-spherically decaying electromagnetic radiation". There is no evidence that Applicant's claimed invention is in possession of the claimed capability, neither as disclosed in the specification, nor as presented by the experimental data in Exhibits A-D. On the other hand, there is an abundance of evidences that the invention does not produce the results as claimed by Applicant:

From the many evidences already detailed in the previous Office Action (see, e.g., pg.85), Applicant's experimental data (Exhibit D) unambiguously shows that Applicant's non-spherically decaying radiation P_{cusp}, is even inferior than a spherically decaying radiation, P_{sub}, i.e., by $P_{cusp}/P_{sub} < 1$ as demonstrated in Exhibit D (see previous Office Action, pg.88). In this regard, an invention that does not produce the results claimed by Applicant is not a "*useful*" invention. See MPEP §2107.01/II.

It is to noted, the ratio P_{cusp}/P_{sub}, which is conventionally defined as Antenna Gain, G, is a key parameter in wireless/free-space communications crucial for

determining the required emitter power to achieve a desired bit-error-rate according to the "Link Budget", as described in [Souw] on pg.3153, Appendix F, Eqs. 43-45. An antenna gain G= P_{cusp}/P_{sub} smaller than unity (i.e., G<0 dBi), as demonstrated in Applicant's experiment, is essentially *useless*, since RF antennas conventionally used in wireless communications have gains much larger than unity.

In this regard, conventional phased antenna array has been designed, demonstrated and routinely operated for distances up to 100 km (see, e.g., Polishuk et al. (see previous Office Action) and Kim, US-PGPUB 2001/0046840, sect. [0005], [0007], [0012]). More specifically, Bosch et al. (USPAT 5,839,053) discloses an RF antenna having a minimum antenna gain of 25 dBi (i.e., equivalent to $P_{cusp}/P_{sub} > 316$!) for use across a link distance of 250-400 km ! Therefore, there is no justification to restrict experimental data only to 900 m or less, as done by Applicant, so far. All what Applicant needs to do is to prove that Applicant's phased array performs better than conventional arrays (i.e., $P_{cusp}/P_{sub} > G_{conventional} >> 1$) up to 100 km distance.

Applicant's attempt (Appendix, pg.26, lines 4-9 from bottom) to give a reason for failing to show $P_{cusp}/P_{sub} > 1$ is unpersuasive, since it is neither supported with any reason nor hard evidence, and furthermore, since an attempt to justify a failure is not a substitute for evidence of success (see previous section 14). Applicant's further attempt to prove or justify a non-spherically decaying radiation by extrapolating the experimental data of Exhibit D is unpersuasive, especially because such a behavior would ultimately violate the fundamental law of the conservation of energy. The mathematical showing of such violation has been demonstrated on pg.85 of the previous Office Action. The

Examiner's refutation is *independently* supported by Kirk T. McDonald's in an article titled "*Radial Dependence of radiation from a Bounded Source*", available from the website <http://www.hep.princeton.edu/~mcdonald/examples/bounded.pdf> (for the validity of the reference, see MPEP §2107.02/IV/IV), which is specifically and expressly dedicated to refute Applicant's publication article presented as Exhibit C in this examination.

Such a violation of a fundamental law of nature is an obvious and undeniable proof that Applicant's invention is *wholly inoperative*. As such, the invention does not operate to produce the claimed results, and hence, not a useful invention in the meaning of patent law. See MPEP §2107.01/II; *In re Newman v. Quigg*, 877 F.2d 1575, 1581, 11 USPQ2d 1340, 1345 (Fed. Cir.1989); *In re Harwood*, 390 F.2d 985, 989, 156 USPQ 673, 676 (CCPA 1968); *In re Fregeau v. Mossinghoff*, 776 F.2d 1034, 227 USPQ 848 (Fed. Cir. 1985)); *In re Houghton*, 433 F.2d 820, 167 USPQ 687 (CCPA 1970)); *In re Swartz*, 232 F.3d 862, 56 USPQ2d 1703, (Fed. Cir. 2000)); *In re Ruskin*, 354 F.2d 395, 148 USPQ 221 (CCPA 1966)); *In re Citron*, 325 F.2d 248, 139 USPQ 516 (CCPA 1963)); *In re Eltgroth*, 419 F.2d 918, 164 USPQ 221 (CCPA 1970)); and *In re Ferens*, 417 F.2d 1072, 163 USPQ 609 (CCPA 1969)).

The reason for the *incredibility* of the disclosure has been clearly stated in all the previous Office Actions, and is repeated again in the preceding sections of this Office Action. The experimental data as presented in Exhibits A-D also failed to provide any valid evidence, as already presented in the previous Office Action, which is again repeated in the preceding sections. Sure, Applicant might recite one or even hundreds

of specific utilities. However, without any evidence, Applicant's assertion of utilities are all *incredible*. Furthermore, there are plenty of evidence that one of ordinary skill in the art *would doubt the truth of Applicant's statement of utility. In re Brana*, 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995). See MPEP §2107.01/III.

Throughout the whole history of science and technology a real invention that is also useful would have been quickly replicated by peers, which is here obviously not the case with Applicant's invention. The total lack of replication by other researchers despite the worldwide publications over so many years (since 1999-2000) is a tacit evidence, that, either the invention does not work as claimed, or it is not useful, or both. A typical example of a really useful invention is the "*buckminsterfullerene*" (carbon-60 macromolecules), which has been quickly replicated by a very large number of independent researchers in a matter of months.

Applicant's "*evidence*" based on Bolotovskii's articles is unpersuasive, since (a) Bolotovskii's work is not Applicant's invention, nor is Bolotovskii's article a result of Applicant's invention, and (b) Applicant's has misinterpreted Bolotovskii's article by *imagining* a phase velocity as a real velocity. Applicant's misinterpretation of Applicant's own reference (Bolotovskii) is already identified by no less than four discrepancies on pg.51-56 of the previous Office Action. Contrary to Bolotovskii's, any "superluminality" in Applicant's invention is a *mere imagination* (see previous Office Action, pgs.51-55). The same thing with the "acceleration" in Applicant's invention, which is also a *pure imagination* (see previous Office Action, pg.76). As generally known in the art, a mere imagination or re-interpretation or re-definition of any terminology cannot possibly

produce any *real* result, i.e., an empirically observable effect. In this case the real observable is the phase velocity V_d already well known in phased array beam forming/steering (see previous Office Action, Eqs.1.c-d). This real phase delay is *imagined by Applicant* as a "superluminal velocity" and/or "acceleration" in case of a curved phased array. Such imagination will never be able to produce any effect different and/or in addition to the what is already well known to phased array beam forming/steering so far, simply because they exist only in *Applicant's imagination*, but not in the real world. As such, the claimed invention has neither substantial nor asserted utility. This obvious invalidity of mere imagination to back-up any claim of real effect is more than enough to suggest that "*it is more likely than not that the Applicant's statement of utility is false*", thus justifying the previous conclusion that Applicant's invention is *incredible*, and hence, *wholly inoperative*. See MPEP §2107.01/III.

The reason for rejecting the Affidavit and Declaration of Dr. Rickel based on MPEP §716.01(c) is already detailed in the previous Office Action, i.e., on pgs.49-50, subparagraph (42.c) and on pgs.97-107, subparagraph (44).

There is no single evidence for Applicant's claim that the Examiner's contention "*disagrees with the assessments of the referees and editors of the prestigious journals*" (pg. 15 of 05/18/2005 Remarks). As generally known in the art, a publication of Applicant's work in a professional journal does not at all mean that the referees and editors agreed with Applicant's opinion and interpretation. In case Applicant disagrees with this Examiner's conclusion, Applicant is invited to provide a declaration from the referees and editors of the respective journals.

There is no evidence for Applicant's contention that some experts recommended Applicant's invention for publication. Insofar as one of ordinary skill in the art understands, it was the Applicant who wished the experiment to be published. The wish is granted, merely because there is no objection to publish any experimental result, neither is there any restriction nor prohibition for any author to freely interpret his own results, as there is also no reason to prohibit any author of contradicting Applicant's article, opinion and interpretation.

Contrary to Applicant's claim, a large number of experts contradict Applicant's invention, exactly in the same manner as the Examiner's rejection carried out throughout this examination. Even Applicant's own references cited in the new IDS have turned out to justify the Examiner's standpoint against Applicant's (see previous section 6). In addition to those experts already cited in previous Office Action(s), such as Hewish and Hannay, a new evidence for such a contradiction can be found in Kirk T. McDonald's new article titled "*Radial Dependence of radiation from a Bounded Source*", <http://www.hep.princeton.edu/~mcdonald/examples/bounded.pdf> (for the validity of the reference, see MPEP §2107.02/IV/IV).

Applicant's argument on page 15 that all expert opinions previously cited by the examiner predated Applicant's publication of experimental results, and that those opinions should have been overcome by the "*success*" of Applicant's experiment, is unpersuasive, since not a single feature of Applicant's experimental results constitutes a "*success*", as clearly demonstrated throughout this Office Action.

Applicant's arguments on pg.16 of the 05/18/2005 Remarks against the Examiner's proof of Applicant's violation of energy conservation on pg.85 of previous Office Action is unpersuasive, since the proof has been made without any presumption of beam width, as alleged by Applicant. Moreover, the Examiner's proof is supported by an independent researcher, Kirk T. McDonald, as recited above, who specifically refutes Applicant's interpretation of experimental data presented in Exhibit C in this examination, i.e., regarding Applicant's claim of non-spherically decaying radiation.

Applicant's further arguments on pg.16 regarding Fresnel distance is unpersuasive based on three independent *prima facie* showings:

(a) As demonstrated on pg.86 of the previous Office Action, a laser beam also shows non-spherical decay ($1/R^x$ with $x<2$) to distances very much larger than the Rayleigh or Fresnel distance, depending on the origin where the radius distance R is measured from (see previous claim rejections, section 25). This compares to the coordinate origin in Applicant's experiment in Exhibits A-D.

(b) As recited in the last Office Action on pgs.77-78, Hewish [Hewish'1998, pg.L28] says that for a linear phased array as Applicant's, the effective distance where a spherical decay would start is much larger than the Fresnel distance.

(c) As recited in the last Office Action on pgs.86, both Hannay [PhysicsWeb'2004] and Hewish [Science'2000] estimated the spherical decay behavior would start at about 10-80 km, thus much larger than the range of Applicant's experiment presented in Exhibits A-D.

Therefore, Applicant's Exhibits A-D do not provide any support to Applicant's claimed invention, which thus remains incredible and inoperative as a whole.

44.C. <u>The Experimental Data Stands Unpersuasive</u>

(a) Applicant contends that Applicant's Fig.4 does not agree with the geometry of the experiment of Exhibits A-D. This justifies the Examiner's conclusion that the experimental results does not provide support to Applicant's disclosure, as recited above. Therefore, the Examiner's requirement for Applicant to make a choice between 3(a) and 3(b) is appropriate.

(b) Dr. Rickle's declaration has been considered unpersuasive, point-by-point, in the previous Office Action, section 44, pgs.97-107, which is herewith incorporated by this reference. Furthermore, such an affidavit has been determined to be ineffective for a rejection under §101 and §112/¶.1 in compliance with MPEP § 716.01(c) (see previous office Action, sect. 42(c), pg. 49-50). To establish a credibility of Applicant's invention only facts, i.e., hard evidence, are acceptable, but not mere arguments.

(c) There is no evidence that Applicant's "*spherically decaying component generated by Applicant's apparatus has a continuous spectrum containing a wide range of frequencies*", as claimed on pg.18 of the 05/18/2005 Remarks. Applicant's Exhibits B and C only provide theoretical calculations, but no experimental data. Exhibit D only shows two frequencies, but not a continuous spectrum claimed by Applicant. As a matter of fact, the Examiner has expressly requested that Applicant provides a FULL

spectrum of the measured signal of Exhibit D. A copy of this request on page 59 of the previous Office Action is given below:

> *To clarify all these discrepancies it would be helpful if applicant provides a full spectrum of the measured signal covering the entire range from 46 MHZ to f+=598.7 MHZ on the same scale that allows intensity comparison. This will verify the examiner's conclusion regarding the DSB/SC modulation in relation with the previously cited Hewish's remarks (IDS/PhysicsWorId'2000), also to verify applicant's theoretical analysis presented in the supporting papers cited above, while indirectly proving the irrelevance of the 46 MHz modulation and the 10^0 curvature of applicant's antenna array.*

Applicant's failure to provide the above requested full spectrum is here considered as an inability to prove a continuous spectrum specifically claimed by Applicant in Exhibits B and C, whereas Applicant's recitation of "*amplitude*" on page 18/lines 6 in response to the Examiner's request cited above, fails to address this important request of evidence, i.e., a full spectrum of the measured signal.

The same request for a full spectrum is herewith reiterated by the Examiner with strongest emphasis. Applicant is here notified to consider this request with imperative seriousness, not to be discussed away by presenting other things irrelevant to the requested data. The data here requested is a full spectrum from 46 MHZ to 598.7 MHZ on the same scale that allows intensity comparison.

(d) There is no evidence that "*a cusp would not have been generated had there been no curvature*" in the array. In case Applicant disagrees with this VOID of evidence, Applicant is required to provide the necessary experimental proof. Theoretical calculation or mere argument is unpersuasive.

There is NO "*acceleration in the motion of the distribution pattern of the source*", as claimed by Applicant. Such acceleration exists only in Applicant's mind as *pure imagination*, which is totally incapable of producing any real effect.

(e) Applicant's claim of only one cone in Fig.3 is totally non-sensical. What, then, is the specific angular position $\varphi^{\wedge}$ (in a $\theta=0$ plane) of k_x representing the cone? And why must the cone (represented by k_x) take that particular angle $\varphi^{\wedge}$, where there is in fact no distinguished φ in the *rotation-symmetric* motion of the source around the circle? The Examiner has never meant a radiation of *two* cones, as alleged by Applicant (Remarks, pg.18, lines 2-4 from bottom). The second cone at k_x' in the Examiner's Fig.4 (previous Office Action) represents a *continuous* series of cones around the entire circle, *not just two* cones, as misunderstood by Applicant.

Evidence for the examiner's standpoint is demonstrated by a copy from the previous Office Action, section 43.e.2 on pg.68:

> *"Otherwise, applicant has no choice except to agree with the examiner that in reality the locus of C is not a line along the z axis as illustrated in applicant's Fig.4, but* ***smeared out*** *2nπ-fold around the z axis, leaving it --at most-- defined by the coordinates (θ,z) alone. This will destroy any significance of interpreting the cusp as a diffraction 'spot' ".*

This also has been clearly explained by the Examiner in the previous Office Action in a language that is easy to understand to one of ordinary skill in the art, i.e., on pg.96, which is here reproduced:

> *(c) Hard evidence would be necessary to reconcile both the minor and major discrepancies identified in sub-paragraph 43(e) between the geometry of applicant's disclosure (Fig.4) as opposed to the geometry of the experiment, and provide a complete*

> *diagram of the locus of the cusp similar to Fig.4 of the disclosure, but covering the distance range of the experiment, i.e., at least from 0 to 900 m. The necessary diagram should simultaneously also show how this cusp locus relates with the geometry of the experiment shown in Figs.3-11 of Exhibit D (see Fig.3 of this office action).* ***In case the cusp locus is not smeared out, it would be necessary to explain, why it is not smeared out*** *despite the rotation-symmetric traveling wave used in the experiment and specify the* ***unique value of φ^ in the experiment****, complete with a persuasive reasoning.*

In the copied Examiner's text above, the wording "*unique value of φ^*" unambiguously indicates the Examiner meant only one single cone, not two cones, as alleged by Applicant.

However, a further dispute over the uniqueness of φ^ is *moot*, because in the 05/18/2005 Appendix Applicant has admitted the *Examiner's correctness* regarding this continuously smeared values of φ^ (see section 42: "Examiner's Comments on Applicant's 05/18/2005 Appendix).

44.D. The Claims are Indefinite

The term "accelerating" or "acceleration" remains indefinite, insofar as Applicant does not acknowledge that this acceleration only exists in Applicant's mind as pure imagination. The reason is, there is no acceleration as understood by one of ordinary skill in the art, but only a special sequence of phase delays in an antenna array. Therefore, as long as Applicant keeps denying that Applicant's "acceleration" is no different than (i.e., nothing else but) a special sequence of phase delays well known in phased array beam steering, Applicant's term "accelerating" or "acceleration" remains

indefinite, simply because one of ordinary skill in the art does not know, what is meant by Applicant with his "accelerating" or "acceleration".

45. Examiner's Response to Applicant's Appendix in Remarks & Arguments

(a+d) Applicant's claim of continuous source distribution is deemed incredible, because the entire disclosure has been determined as being inoperative and rejected under §101 and 112/¶.1. Thus Applicant's arguments regarding what the radiation should be if the radiation source were continuous, is considered void and unpersuasive. In particular, such proposition is obviously a pure imagination that cannot be taken into consideration, simply because an imagination is incapable of generating any real effect.

In the experiment of Exhibit A and D meant to support the disclosure, the source distribution is obviously discrete. The pertinent claims are also rejected under §102 and/or §103 based on prior art, *in addition* to the previously made §101 and §112/¶.1 rejections, i.e., by interpreting the claims in such a way so as to remove the §101, §112/¶.1 and §112/¶.2 rejections. In this additional rejections the source distribution is unambiguously discrete. Since Applicant's experimental support unambiguously uses discrete source distribution, the use of prior arts having also discrete source distribution is proper.

(b) Applicant's claim of a distinction between the phase velocity in a discrete set of elements of a phased array antenna (as in the applied prior arts) and a continuous traveling wave is based on an incredible disclosure, and hence, is considered void and unpersuasive.

(c+e) There is no evidence, neither theoretical nor experimental, of a radiation that decays like 1/r, because it would violate a fundamental law of nature, i.e., the conservation of energy. Applicant's theoretical claim has been determined incredible based on Examiner's proof on pg. 85 of the previous Office Action, and independently also by Kirk T. McDonald's, further supported by Hewish and Hannay, as recited previously. Applicant's experimental claim was based on an unjustified extrapolation of experimental data, which not only is scientifically a mere speculation, but also must be deemed invalid for violating the conservation of energy, as recited previously. Applicant's further argument (pg.22) regarding Raleigh distance has been previously refuted in sections B(a,b,c). The only acceptable evidence would have been measurements over 10-80 km, as demanded by Hannay and Hewish. However, Applicant has failed to provide such an evidence of measurements.

46. Examiner's Comments on Applicant's 05/18/2005 Appendix

The following Examiner's comments will be short and concise, since most arguments are the same as already discussed in the main text of Applicant's 05/18/2005 Response. The numbering of the Examiner's comment below will follow the same numbering as used by Applicant in the 05/18/2005 Appendix.

4. Applicant's example of X-ray illumination is non-representative for Applicant's disclosure. The X-ray example does not provide any reason against the general understanding in the art that Applicant's superluminal velocity is no other than Applicant's *imagination* over the phase delay well known in beam steering. The bottom

line is, merely *imagining* a known phenomenon as being something else will not generate any new result (such as "*Doppler effect*" already brought up in the previous Office Action, sect.9 on pg.9, and "*centripetal acceleration*" on pg.10 and Exhibit D).

7a. The argument based on Special Relativity is the Examiner's own rejection, not Hewish's. Applicant is reminded, *no prior art is required* in a rejection under 35 U.S.C. §101 and §112/¶.1 based on violation of natural law and non-enabling disclosure, as in Applicant's case. Furthermore, there is no reason, whatsoever, why Hewish and other experts would ever object Applicant's invention by exactly the same reason as the Examiner does. However, the accumulation of all those objections sums up to an obvious incredibility of Applicant's invention. In this regard, Applicant's argument against the Examiner's rejection is unpersuasive, insofar as Applicant is unable to refute the rejection. Verbal argument, let alone mere contradiction without argument, as set forth by Applicant, is not acceptable.

7b-d + 23-25. Electric current consists of electrons, and hence, incapable of achieving superluminal velocity simply by virtue of Special Relativity Theory. However, to say that Applicant's "distribution pattern" is moving with "superluminal velocity" is nothing else than Applicant's own *imagination* not shared by those of ordinary skill in the art. The bottom line is, no imagination is capable of producing any real, i.e., empirical, effect.

7e-f. The issue has been already addressed and refuted in the main text of this Office Action, in which the discrepancies between Applicant's *imagination* and Bolotovskii's interpretation have been also unambiguously identified. Applicant's recitation that "*the example of the pair of scissors ... directly corresponds to what occurs in Applicant's*

apparatus" is an implicit contention that Applicant's interpretation is nothing else but a mere imagination not shared by those of ordinary skill in the art. A citation from the 12/15/2203 Office Action (also cited above on pg.11) reads:

> "*The affidavit's example of a pair of scissors 'whose tips are moving just below the speed of light but the intersection of the blades moves at a speed faster than the speed of light' **completely agrees with the examiner**, that the material object itself (the scissors' tips or blades and the current or charge itself) does not move faster than light, whereas the "superluminally moving" intersection represents locally and materially different parts of the blade that are **not interrelated to each other by any causality**.*"

Being a pure imagination, the "superluminal scissors", too, are not capable of producing any real --i.e., empirical-- effect. In case Applicant disagrees, Applicant is invited to provide an empirical evidence for a real effect caused by the scissors.

8+13+43m. There is no evidence that the editors and referees agree with Applicant's interpretation (see main text). In the contrary, the experts (such as Hewish, Hannay and McDonald) disagree with Applicant and agree with the Examiner.

9. Applicant contends that Applicant's distribution is "not material". How come that Applicant persistently claims that such a distribution would cause a "*Doppler effect*" and a "*centripetal acceleration*", all effects that could only be produced by material causes? The same criticism to Applicant's invention has been recited by Hewish (see previous pg.9). It is here to be emphasized that *imagination* can not possibly produce real effects, such as "*Doppler effect*" and "*centripetal acceleration*". Ever since the very beginning of the examination, the Examiner maintains that Applicant's claim of non-material distribution pattern moving with superluminal velocity *only exists in Applicant's*

imagination. The correct and real interpretation is simply a "*phase velocity*" well known in phased-array beam-forming/steering.

There is no evidence for Applicant's claim of a *continuous source distribution* and its unique capabilities, as claimed. Applicant's experimental data (Exhibits A-D) only shows evidence for a discrete source distribution, just the same as the examiner's prior art references. Moreover, Applicant's experimental results do not show the unique capabilities as claimed.

10+28. The examination has consistently proven that Applicant's apparatus is nothing else than "*a phased array antenna operating in beam steering mode*". This proof includes *quantitative* estimates regarding Applicant's experimental data using conventional beam steering physics, which unambiguously proves the correctness of the Examiner's interpretation of Applicant's invention being nothing else than "*a phased array antenna operating in beam steering mode*". There is no evidence that Applicant's apparatus could ever produce a "cusp" different than a beam forming effect well known in phased array beam steering. Applicant's interpretation obtained from unjustified extrapolation of the experimental result given in Exhibit D has been rejected as unpersuasive, for violating the legal procedure of experimental physics (see previous Office Action, which is again repeated in this Office Action).

12+14+15. The examination has established a *prima facie* evidence beyond any doubt that Applicant's invented apparatus is nothing else but a phased array in beam steering mode. There is no evidence that Applicant's result is different from a phased array in beam forming/steering mode. Every radiation property claimed by Applicant as being

unique to Applicant's phased array has been *quantitatively* shown by the Examiner in the previous Office Action as being no other than the radiation property of a conventional phased array.

16+30+31. There is no evidence for Applicant's rotating point source, as claimed. Applicant's experimental data presented in Exhibit D is no other than discrete stationary point sources excited with a special sequence of phase delays conventionally known in the art to result in beam forming and beam steering.

17+32-34. Applicant's result (Ref.8) is no different than that of a phased array in beam steering mode, as unambiguously proven by the Examiner with quantitative estimates presented in the previous (11/30/2004) Office Action, "*Evaluation of Applicant's Experimental Data*", said evaluation incorporated herein by this reference.

18-20. Applicant's disclosure regarding "polarization synchrotron" is inadequate, thus leading to a 35 U.S.C. §112/¶.1 rejections of claims 28 and 79 based on lack of written description and various forms of non-enabling disclosure (see claim rejections). Claims 28 and 79 have been also rejected over prior art, assuming that the "polarization synchrotron" is no other than plasma sheath waveguide antenna well known in the art, as described in <http://www.aeronautics.ru/plasmaantenna.htm> and <http://iron-eagles.tripod.com/articles/active.htm>.

Applicant's argument is unpersuasive, insofar as Applicant is unable to come up with an enabling disclosure that is different than the plasma sheath waveguide antenna described in the cited references.

21+26+40. The Examiner's refutation is based on rigorous mathematical proof derived from well known formulae given by Melles-Griot, a well known manufacturer of optical devices. Applicant's stand against Examiner's mathematical proof is merely a contradiction, but not an argument. Furthermore, Applicant's argument is unpersuasive insofar it is unable to show, that the examiner's proof is incorrect. As generally known in the art, verbal arguments are never acceptable against mathematical proof.

22+37+43b-c-d. There is no evidence whatsoever for Applicant's claim of a continuous distribution of spectrum, the latter having been expressly requested in the form of hard evidence already in the previous Office Action. In this regard, Applicant's 05/18/2005 Response has been determined as being Non-Compliant (see above).

27+35. The examination has established a *prima facie* evidence beyond any doubt that circular array does not cause any acceleration, as claimed by Applicant. Such "acceleration" exists only in Applicant's *imagination*, as already recited previously. In this regard, no imagination is capable of producing any real result. Applicant's claim of circular "motion" is nothing else than some form of circular arrays, cylindrical arrays and/or conformal arrays already well known in the art since 37 years (see numerous prior art references cited above).

29. The case of a pulsed source is already addressed in a previous Office Action.

36. The examination has established a prima *facie* evidence beyond any doubt that Applicant's invention is nothing else but a phased array in beam steering mode, as described in the prior art references cited in this examination. Every radiation property

claimed by Applicant as being unique to Applicant's phased array has been *quantitatively* shown by the Examiner in the previous Office Action as being no other than the radiation property of a conventional phased array. Therefore, there is no reason, whatsoever, to believe that the cited prior art references are not capable of doing what Applicant's invented device is able to. If Applicant persistently claims the cited prior art references do not produce non-spherically decaying radiation, then *neither does Applicant's*. In such a case, the examination should be immediately terminated, since Applicant's effectively contends not being able to generate the claimed results.

41+43a. The difference between Bolotovskii's and Applicant's *imagination* has been detailed in at least four cases in the previous Office Action (see above). Applicant is trying to stretch out Bolotovskii's statements beyond the borders of credibility (see previous Office Action).

43a.1. If 46 MHz is not necessary, why did Applicant use that kind of modulation? Hard evidence in the form of a full spectrum has been requested by the Examiner. However, Applicant prefers not to clarify the issue but keep it obscure and unresolved by refusing the examiner's request to provide a hard evidence in the form of a full spectrum (see Non-Compliant Response above). No verbal argument will be accepted.

43a.2-3. There is no evidence whatsoever that Applicant's curved array is able to generate effects other than what is already known to conventional circular and/or conformal arrays in beam steering mode. Every radiation property claimed by Applicant as being unique to Applicant's phased array has been *quantitatively* shown by the

Examiner in the previous Office Action as being no other than the radiation property of a conventional phased array. Again, mere argument is unpersuasive. Only hard evidence counts.

43a.4+43e.3. Applicant has been granted the choice of either (a) the new figures to be considered as part of the disclosure, including new Fig.II, with the result that this application has to be abandoned, for attempting to introduce New Matter, or (b) the new figures are to be ignored, with the consequence that only Fig.4 of the disclosure as originally filed is being considered, the new Fig.II being simply ignored as being unrelated to the application, since it is an obvious contradiction to Fig.4, as originally filed. However, the location of data measurement in Applicant's Exhibit D clearly does not conform with the location of the cusp shown in Fig.4. Therefore, the Examiner's judgment is proper, that Applicant's experimental data is unrelated to the disclosure.

43e.1. Applicant's method of determining a non-spherical decay by extrapolation of experimental data is scientifically and technically unjustified. Furthermore, there is no single evidence that Applicant's "*non-spherically decaying*" radiation is more efficient than a conventional spherically decaying radiation, as already brought up in the previous Office Action. In the contrary, there are hundreds or even thousands of evidences (shown by ***ALL*** of Applicant's own experimental data points, except one) that Applicant's "*non-spherically decaying*" is less efficient than the conventional spherically decaying radiation, which is an obvious self-contradiction that has never been addressed adequately by Applicant. Note, verbal argument is unpersuasive. Only hard

evidence, showing P_{cusp}/P_{sub} >1, would be acceptable. Note also, an attempt to justify a failure will not replace an evidence of success.

It is important to note that conventional phased antenna array has been designed, demonstrated and routinely operated for distances up to 100 km (see, e.g., Polishuk et al. and Kim). Therefore, there is no reason to restrict experimental data only to 900 m or less, and to draw conclusions from extrapolation, as done by Applicant, so far. All what Applicant needs to do is to prove that Applicant's phased array performs better than conventional arrays up to 100 km distance.

43e.2+43.e.4. Applicant's contention that φ^ is extended over 2π (05/18/2005 Appendix, pg.19, lines 5-13 from bottom) is a justification of the Examiner's standpoint based on phased-array beam-steering theory. Evidence for the examiner's standpoint is given by a citation from the previous Office Action, section 43.e.2 on pg.68:

> *"Otherwise, applicant has no choice except to agree with the examiner that in reality the locus of C is not a line along the z axis as illustrated in applicant's Fig.4, but smeared out $2n\pi$-fold around the z axis, leaving it --at most-- defined by the coordinates (θ,z) alone. This will destroy any significance of interpreting the cusp as a diffraction 'spot' ".*

Two conclusions can be drawn from Applicant's contention alone: (a) Since the Examiner's conclusion is based on phased-array beam-steering, Applicant's contention inevitably also means that Applicant's invention is no other than conventional phased array beam steering well known in the art since 37 years; and (b) Applicant's experimental results are all within the expectation and prediction of the phased-array beam-steering theory that has been well known since at least 37 years, including the difference between the direction of f+ and f- given in the previous Office Action, pgs.81-

83. The two conclusions above provide the strongest proofs for the Examiner's *prima facie* evidence that Applicant's invention is no other than a phased-array antenna in beam-steering operation mode. With the Examiner's citation above, it is now also proven that Applicant's "cusp" is not some sort of diffraction spot, as claimed by Applicant, but nothing else than a trajectory of a steered beam. This interpretation remains valid for Applicant's original rotating star model.

43.e.3. Applicant finally agrees with the examiner (and Bolotovskii) that Applicant's device is radiating irrespective of whether the *imaginative* "*speed of the distribution pattern*" is smaller or greater than the speed of light, meaning that Applicant's device behaves like a conventional radiator. So, what then, is the specialty or novelty of Applicant's invention? Contrary to Applicant's faulty logic, the Examiner's conclusion is fully correct, i.e., "*the fact that applicant could still measure a signal although the imaginative phase velocity is only V_d = 0.875c is a solid evidence that applicant's radiation is completely conventional*" .

43.f+g+h. Applicant's allegation regarding "Examiner's confusion with Cerenkov cone" as recited in pg.22 is unwarranted, because the above conclusion regarding φ^ and other parameters of Applicant's experimental data demonstrates the correctness of the Examiner's view, i.e., that Applicant's invention is no other than conventional phased-array beam-steering well known in the art since 37 years, and consequently, that Applicant's interpretation of the 'cusp' as being some sort of diffraction spot is fundamentally wrong. Again, no verbal argument regarding Applicant's non-existent 'cusp' is persuasive. Only hard evidence of R>10-80 km and P_{cusp}/P_{sub} >1, would be

acceptable. As generally known in the art, an attempt to justify a failure is not a substitute for an evidence of success. Note that conventional phased antenna array has been designed, demonstrated and routinely operated for distances up to 100 km (see, e.g., Polishuk et al. and Kim). Therefore, there is no acceptable reason to restrict experimental data only to 900 m or less, as done by Applicant, so far. All what Applicant needs to do is to prove that Applicant's phased array performs better than conventional arrays up to 100 km distance.

43.i. In section (b) Applicant's finally admits that Applicant's method of proving non-spherical decay is based on an extrapolation of the experimental data:

> *"the directive gain of our antenna, by virtue of increasing with the distance r from the source, would considerably exceed those of the conventional antennae referred to by the Examiner (which are independent of r) in the far zone."*

Extrapolating experimental data, especially where there is an obvious objection based on violation of natural law (conservation of energy/power), is an unjustified practice in physics and engineering, and hence unpersuasive in this examination. A more scientific "extrapolation" would be, the plot of P_{cusp}/P_{sub} does not go through the upper limit of P_{cusp}/P_{sub} =1, but saturates over into P_{cusp}/P_{sub} =1.

Applicant's further argument is even more unpersuasive:

> *"The fact that the measured values of P_{cusp}/P_{sub} are smaller than unity in Exhibit D does not mean that our antenna has a low directive or power gain. It means that the particular realization of the invented apparatus that is used in the reported experiments generates a <u>weaker polarization current</u> when run superluminally than when it is run subluminally"*

It is well-known in the art that one can *always find words to justify* every failure. *However, an attempt to justify a failure can not replace an evidence for success.* Since conventional phased antenna array has been designed, demonstrated and routinely operated for distances up to 100 km (see, e.g., Polishuk et al. and Kim), all what Applicant needs to do is to prove that Applicant's phased array performs better than conventional arrays up to 100 km distance.

43k+l. Again, no imagination is here accepted as argument, because a patent is issued for a real invention, which must be capable of producing real, empirically measurable results, not just verbal arguments, and further sophistication of imagination.

43n. Non-spherical decay is also produced by focused beams for a restricted range of distance, as mathematically derived by the Examiner in the previous Office Action. In this regard, both focused laser beam and focused beam from a phased array share the same property. However, Applicant's claim of non-spherically decaying radiation for all range of R is inconsistent with known scientific principles. Therefore, Applicant's claims are additionally also rejected over prior arts under 35 U.S.C. §102 and §103, i.e., by re-interpreting the pertinent claims so as to be consistent with known scientific principles, which also means, different than, or even against Applicant's own interpretation.

44. As previously recited, Dr. Rickel's affidavit has been refuted in great details, point-by-point, in the previous Office Action, section 44, pgs.97-107, such that a repeat would here be totally non-sensical. The Examiner's response to Dr. Rickel's affidavit is herewith incorporated by this reference.

Furthermore, such an affidavit has been determined to be ineffective for a rejection under §101 and §112/¶.1 in compliance with MPEP § 716.01(c) (see previous office Action, sect. 42(c), pg. 49-50). To establish a credibility of Applicant's invention only facts, i.e., hard evidence, are acceptable, but not mere arguments.

Communications

47. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard E Souw whose telephone number is 571 272 2482. The examiner can normally be reached on Monday thru Friday, 9:00 am to 5:00 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R Lee can be reached on 571 272 2477. The central fax phone number for the organization where this application or proceeding is assigned is 571 273 8300 for regular communications as well as for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571 272 5993.

bes

October 19, 2005

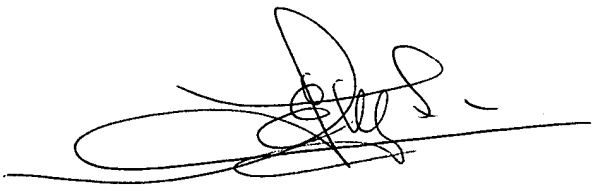
Furthermore, such an affidavit has been determined to be ineffective for a rejection under §101 and §112/¶.1 in compliance with MPEP § 716.01(c) (see previous office Action, sect. 42(c), pg. 49-50). To establish a credibility of Applicant's invention only facts, i.e., hard evidence, are acceptable, but not mere arguments.

Communications

47. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard E Souw whose telephone number is 571 272 2482. The examiner can normally be reached on Monday thru Friday, 9:00 am to 5:00 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R Lee can be reached on 571 272 2477. The central fax phone number for the organization where this application or proceeding is assigned is 571 273 8300 for regular communications as well as for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571 272 5993.



Bernard E. Souw
Patent Examiner – AU 2881
December 22, 2005